

# AAI AUTOMOTIVE INDUSTRIES

**AUTOMOTIVE and AVIATION MANUFACTURING  
ENGINEERING • PRODUCTION • MANAGEMENT**

**OCTOBER 15, 1958**

**NATIONAL METAL SHOW NUMBER**

## ***In This Issue***

**More New Cars and Trucks for 1959—  
Chevrolet, Dodge, Ford, Plymouth, Pontiac  
Missile Programs Discussed at Detroit Meeting  
Report from SAE Machinery Sessions in Milwaukee  
Recovery Factors Analyzed by The Business Pulse  
Improved Mercedes-Benz Fuel Injection System**

**COMPLETE TABLE OF CONTENTS, PAGE 3**

**A C H I L T O N P U B L I C A T I O N**

# it's mainly a matter of **TIMING!**



**Q. WHEN should you replace a machine?**

**A. When you can do it at a PROFIT!**



**O**bsolence is an insidious thing. It can overtake any machine—even a relatively new one—without warning. And when it does, you're producing at a *loss*.

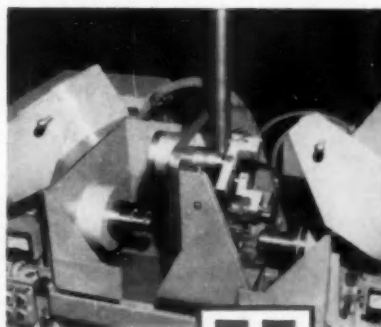
The only way to catch it in *time* is to make frequent studies, comparing the production cost of the old machine with that of the new one that might replace it. Then weigh these costs in terms of investment and return. Up to a certain

point, the old machine will still be profitable to operate. Beyond that point, it's running *in the red*.

Heald sales engineers are well experienced in precise methods of replacement analysis. And they will be glad to help you determine when you can replace an existing machine *at a profit*. Similar cost studies by Heald engineers have pointed the way to many important cost savings.

**For example:** This new Heald Model 322 Bore-Matic replaced a heavy-duty drill for boring and chamfering hydraulic-cylinder piston rods. A cost analysis determined that the investment in a new machine could not be deferred any longer without serious financial loss. As verified by subsequent operation, the new machine offered the following savings:

	Old Machine	New Machine
Parts per hour	11	24
Machine load, per year	3,080 hrs.	1,380 hrs.
Direct & Indirect Labor	9,480 hrs.	3,240 hrs.
Annual Maintenance	\$356	\$100
Annual Operating Cost	\$27,800	\$15,000
Annual Saving, New Machine		\$12,800
Net Return on Investment		39.6%



**YOU pay for obsolescence. Replacement pays for itself!**

## THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

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fifty years*

In 1908—the CHICAGO FIRE DEPT.  
—then as now—was up-to-the-  
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Where the pay-off is on pay-load—in fast cross country service...off the highway...or extra heavy duty hauling—you'll make more miles and cut costs too, with these modern Waukesha truckers' engines. Designed to put

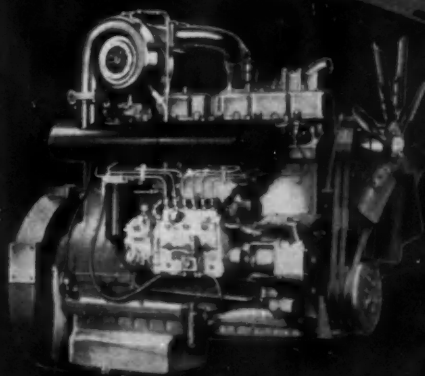
out the power, Waukeshas pull-and-pay day after day without faltering or breakdown.

*Send for Bulletins*

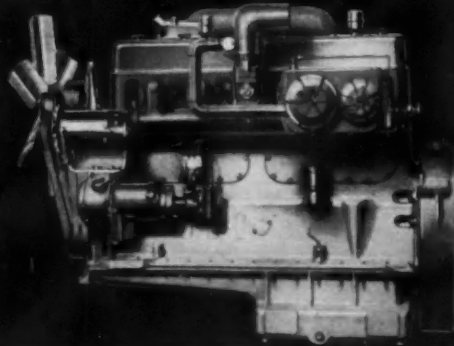
WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.  
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369



148-DKBS Turbocharged  
Diesel, 5 1/4 x 6 inch bore  
and stroke, 779 cu. in.  
displacement, to 280 hp.



WAKB Gasoline or LP Gas,  
6 1/4 x 6 1/2 inch bore and  
stroke, 1197 cu. in. displace-  
ment, to 300 hp.



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# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE PUBLISHED SEMI-MONTHLY

OCTOBER 15, 1958

VOL. 119, NO. 8

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AUTOMOTIVE INDUSTRIES, October 15, 1958

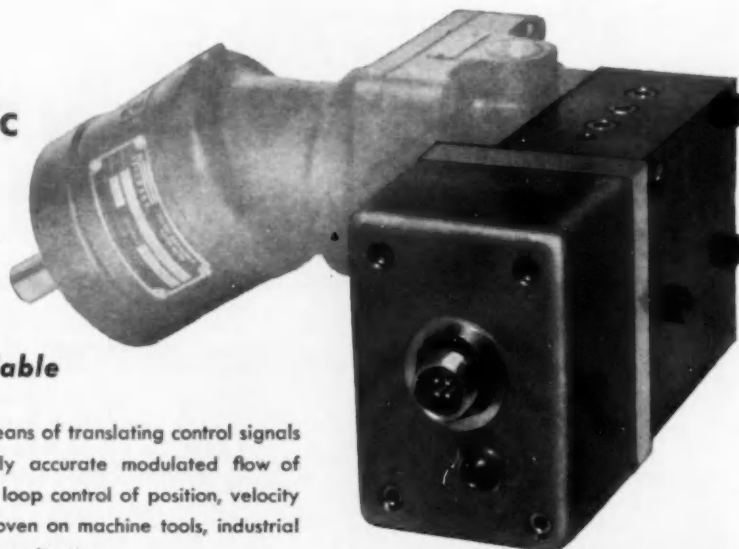
# New **VICKERS** Electro-Hydraulic Servo Valve

has numerous advantages  
for industrial use:

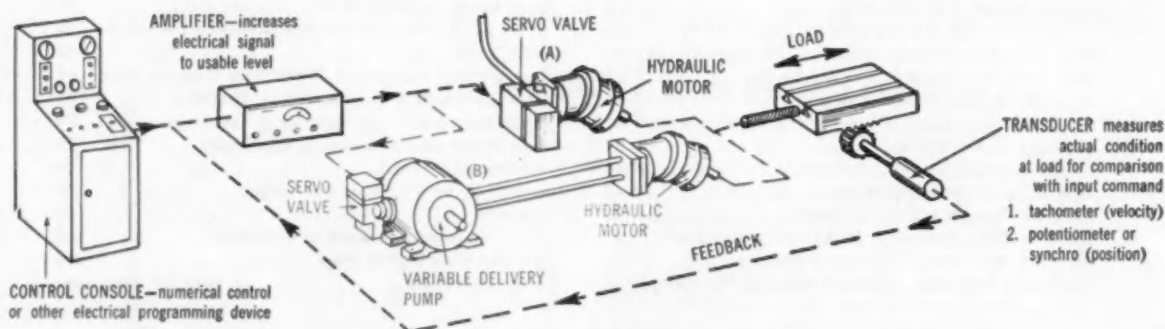
- Extremely Accurate
- Simple • Rugged • Dependable

This valve provides a simple, dependable means of translating control signals from electronic programming into extremely accurate modulated flow of hydraulic power for fast and precise closed loop control of position, velocity and acceleration. Performance has been proven on machine tools, industrial processing equipment and ground ordnance applications.

Simplicity and reliability are exceptional . . . only four moving parts are required. Mechanical feedback linkage with unique variable fulcrum provides optimum flexibility for various conditions of flow, response and pressure. For further information, write for Vickers Engineering Bulletin 58-74.



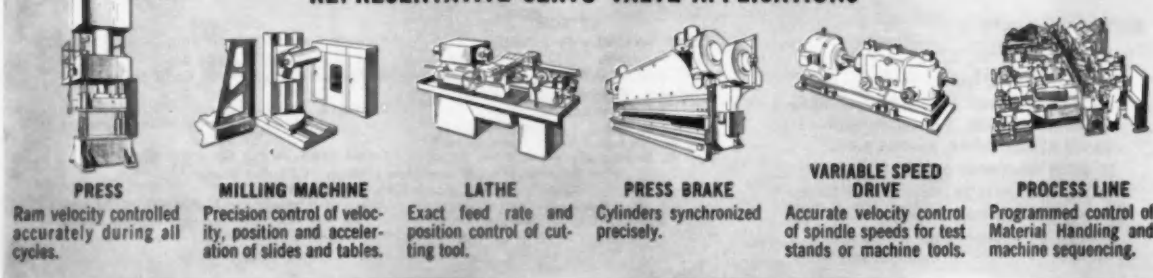
Vickers Electro-Hydraulic Servo Valve integrated with piston type hydraulic motor provides a minimum amount of oil under compression. Integral cross line relief valves are provided as well as variable cross line orifice for controlling viscous damping. This "package" can provide approximately 20 hp @ 3000 psi and 3600 rpm; variable speed of motor is 0-4400 rpm.



Now the flexibility of electronic control can easily be applied to versatile hydraulic power. Vickers new industrial electro-hydraulic servo valve is used (A) to directly regulate the oil to

an actuator (valve motor system). Shown in blue is an alternate application (B) for higher flows when the valve controls a variable volume pump (servo pump system).

## REPRESENTATIVE SERVO VALVE APPLICATIONS



8126

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Machinery Hydraulics Division

ADMINISTRATIVE AND ENGINEERING CENTER

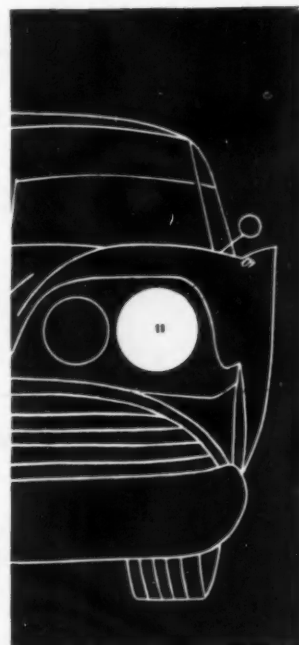
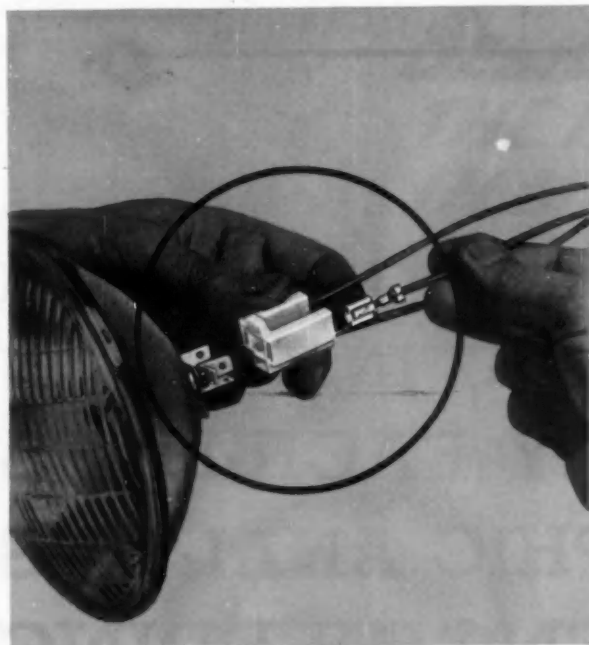
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AUTOMOTIVE INDUSTRIES, October 15, 1958

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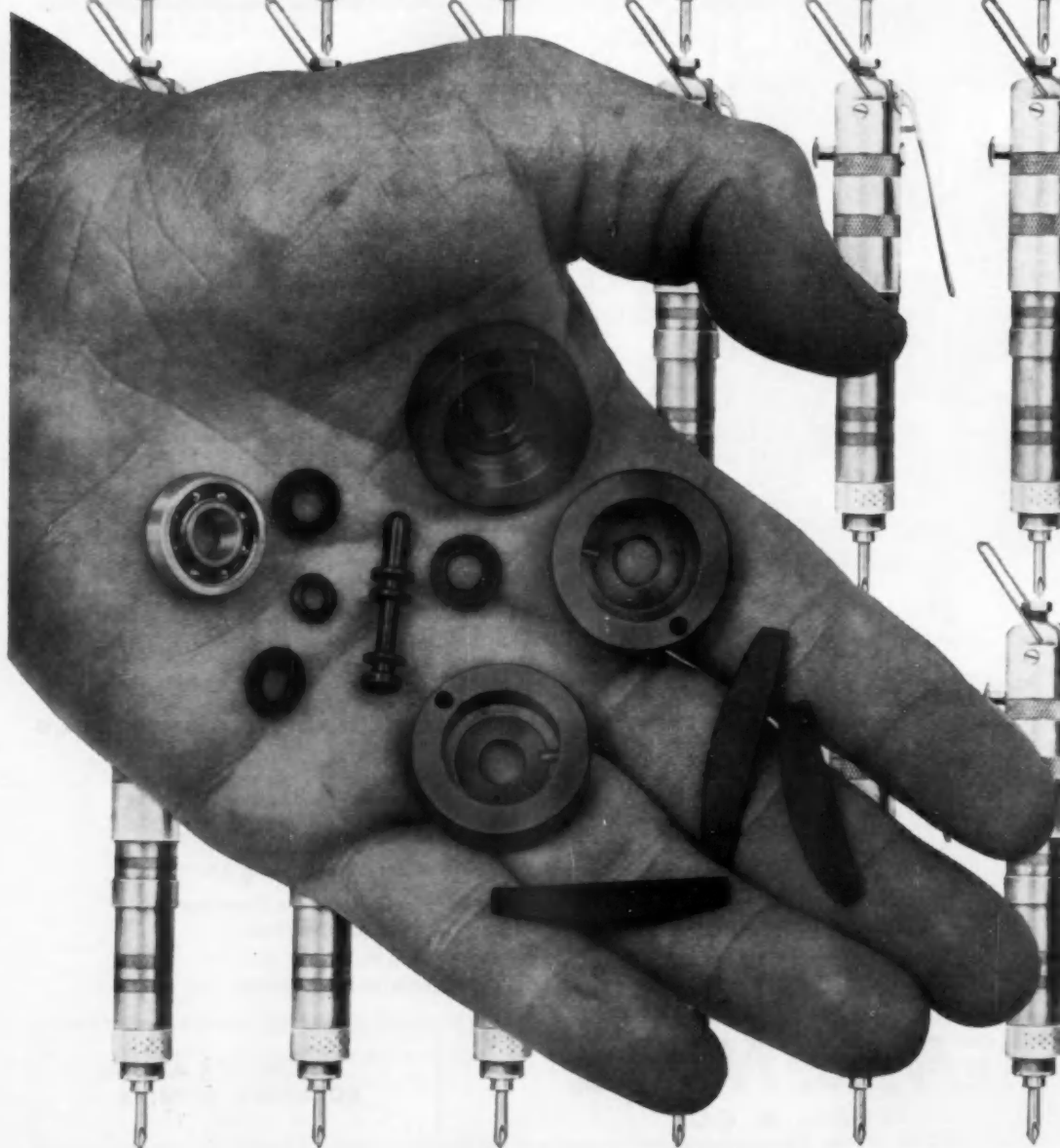
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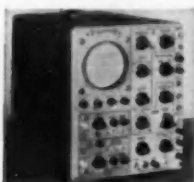
# SCREWDRIVERS

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In one assembly operation, ceramic terminal strips are attached to the oscilloscope chassis with #2 studs and nuts ...any overdriving would shear these small studs, causing the scrapping of an expensive part. Tektronix also uses the CP Magnamatic Screwdrivers in other assembly operations where any ratcheting would slow down production.

Magnamatic's "One-Shot" Clutch runs nuts to a precise, pre-set torque—completely prevents the ratcheting and over



The Type 535 Oscilloscope is one of the precision instruments assembled with CP Magnamatics.

tightening that could tie up production and pile up rejects. And the exclusive Magnamatic muffling principle keeps noise level to a *hush* and production humming even under elbow-to-elbow assembly conditions. For an on-the-spot demonstration or the complete Magnamatic story—tear out coupon and mail right now.



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- ☐ Please arrange demonstration. No obligation, of course!
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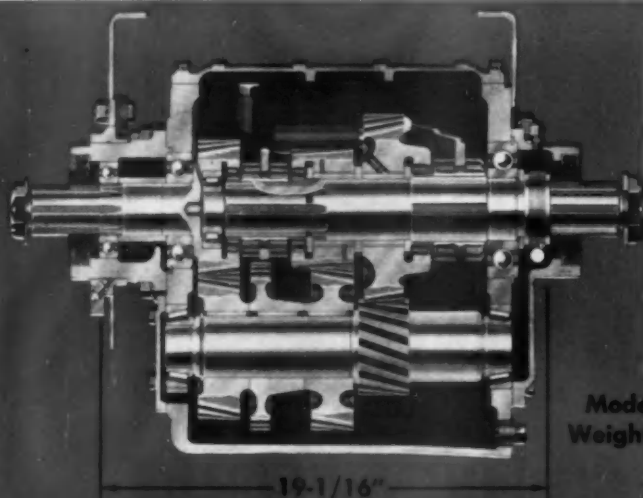


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AUTOMOTIVE INDUSTRIES, October 15, 1958



Model 3-A-65  
Weight—270 lbs.

Model No.	3-A-65
Gear	Ratio
High	.754
Intermediate	1.00
Low	2.221

*Now*

## 3-speed AUXILIARY

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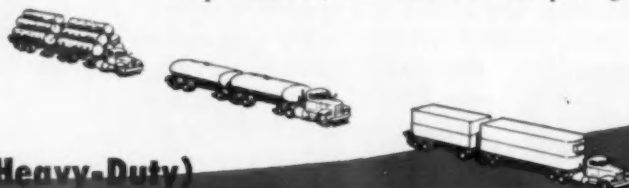
The extremely rugged heavy-duty 92 Series has been completed by the addition of 5 new sets of gear ratios, Models 3-D-92 through 3-H-92. Four new sets of gear ratios, Models 3-E-65 through 3-H-65, have been added to the popular medium heavy-duty 65 Series.

### Split Gears and GO

The expanded line of three-speed auxiliary units includes splitting ratios, both underdrive and overdrive. With these splitting ratios, the engine can operate at maximum horsepower through a full range of vehicle speeds. Ideal for over-highway operation, the extra gears allow faster schedules, greater profits.

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Deep reductions, in combination with splitting ratios,



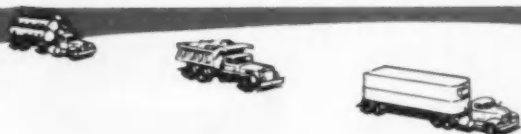
### 92 SERIES (Heavy-Duty)

Model No.	3-A-92	3-B-92	3-C-92	3-D-92	3-E-92	3-F-92
Gear	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio
High	.74	.84	.75	.75	.84	.84
Intermediate	1.00	1.00	1.00	1.00	1.00	1.00
Low	2.09	1.24	2.64	1.24	2.09	2.64

FULLER MANUFACTURING COMPANY (Subsidiary, Eaton Manufacturing

## 65 SERIES (Medium Heavy-Duty)

3-B-65	3-C-65	3-D-65	3-E-65	3-F-65	3-G-65	3-H-65
Ratio	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio
.804	.754	.804	.804	.754	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.32	1.32
1.239	1.239	2.221	1.74	1.74	2.221	1.74



# ...the most complete line of TRANSMISSIONS

offer maximum flexibility both on and off-highway where the deep reduction is required for extreme grades and soft footing, and where splitting efficiency is required for traffic conditions.

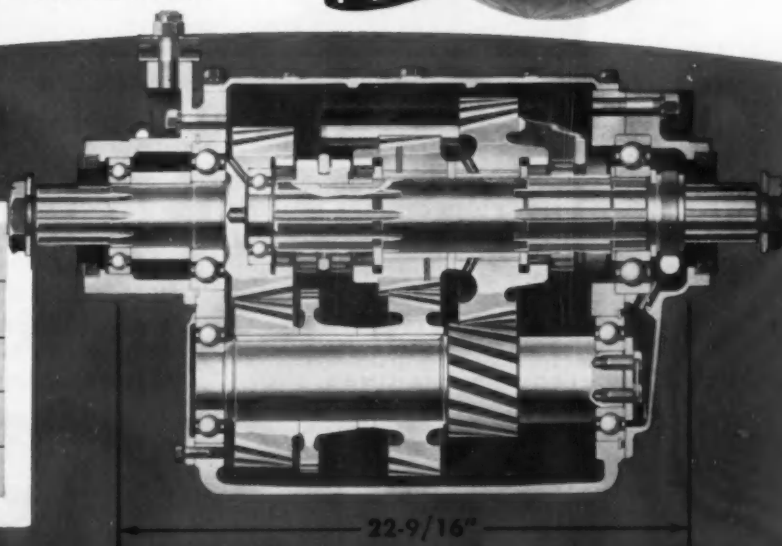
### Longer Equipment Life

With engines working in the most efficient torque and horsepower range, there is less lugging . . . less wear . . . and greater fuel economy. Result: lower maintenance costs, less downtime, longer engine and transmission life.

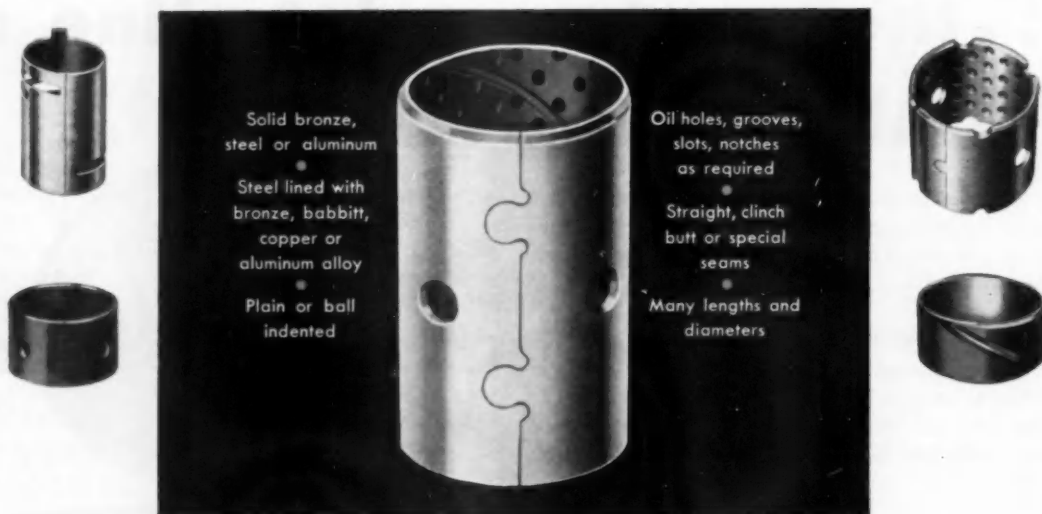


Model 3-A-92  
Weight—350 lbs.

3-G-92	3-H-92
Ratio	Ratio
1.00	1.00
1.327	1.327
2.09	2.64



Company) Transmission Division • KALAMAZOO 13F, MICHIGAN • U.S.A.



## LOW COST BUSHINGS with Bearing Performance!

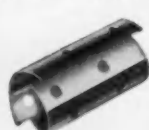
Bimetal bushings, in a variety of alloys on steel, provide bearing load-carrying qualities, *with the advantages of low-cost production.* Quality-controlled manufacturing to your specifications. Complete engineering service. Write:

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FEDERAL-MOGUL-BOWER BEARINGS, INC. 11037 SHOEMAKER, DETROIT 13, MICHIGAN



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Lined



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Tubes



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Thrust Washers



Aluminum or  
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FROM THE LEADER  
IN MODERN BRAKE DESIGN...**

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The Stopmaster has been proven by thousands of miles of rugged, demanding road trials . . . and by long hours of testing by trained technicians using the extensive laboratory facilities of the Rockwell-Standard Brake Division.

The many outstanding features of the Stopmaster brake make this design the answer to the industry's long-standing need for an improved, higher performance, more dependable brake.

## HERE ARE ONLY SOME OF THE ADVANTAGES THE NEW STOPMASTER BRAKE WILL OFFER YOU!

- **COOLER OPERATING** — For extended brake life and durability.
- **LIGHTER WEIGHT** — For greater vehicle payload capacity.
- **LONGER DRUM LIFE** — For more dependability — lower maintenance costs.
- **LESS BRAKE FADE** — For safer . . . continuous operation.
- **LONGER LINER LIFE** — For lower operating costs — less maintenance.
- **GREATER INTERCHANGEABILITY** — Maximum number of common components for smaller parts inventory.

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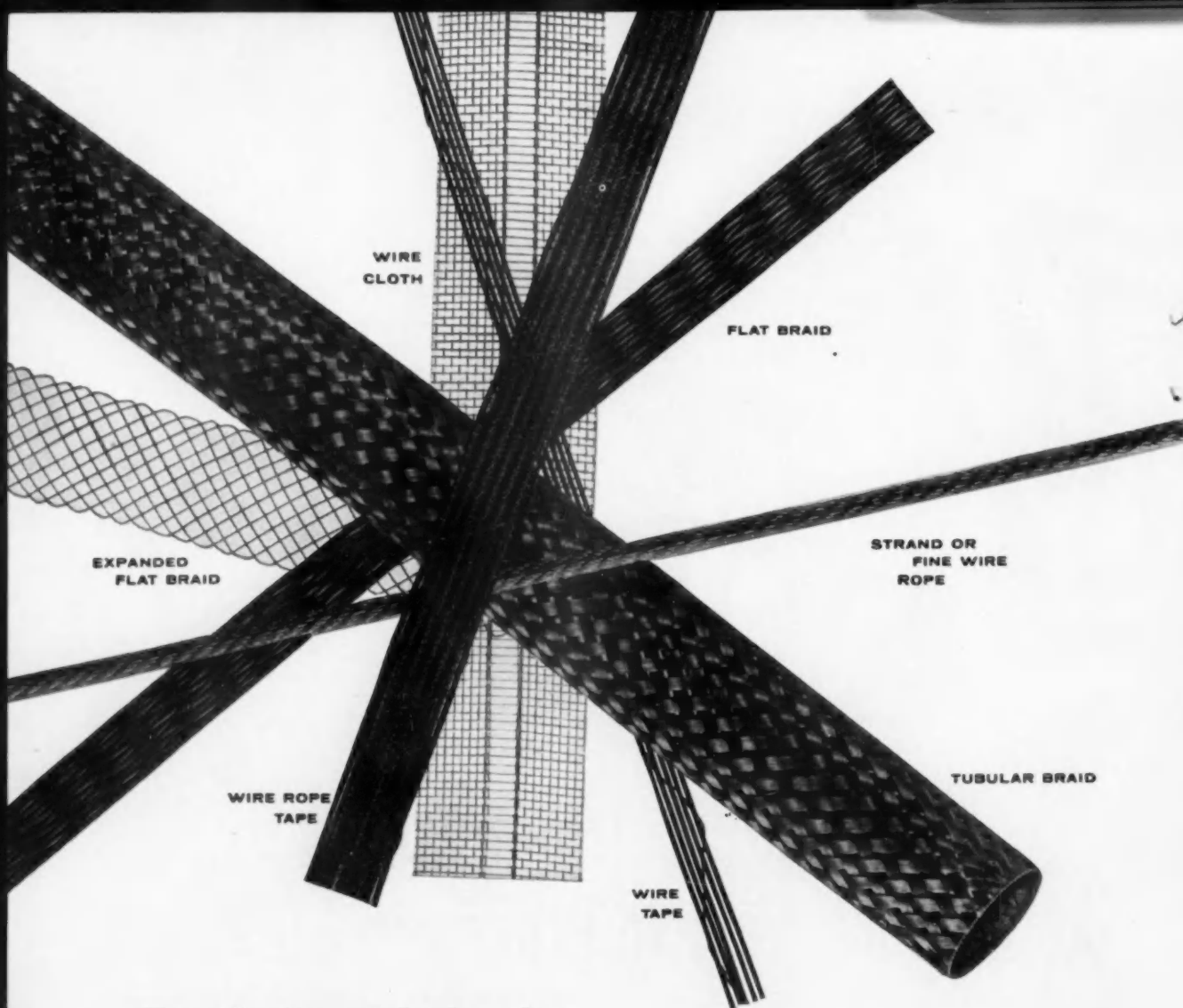
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**ROCKWELL-STANDARD  
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*For every industrial, agricultural or automotive  
application where braking is required!*

**BRAKE DIVISION Ashtabula, Ohio**





WIRE  
CLOTH

FLAT BRAID

EXPANDED  
FLAT BRAID

STRAND OR  
FINE WIRE  
ROPE

WIRE ROPE  
TAPE

WIRE  
TAPE

TUBULAR BRAID

*Familiarity might breed*

## NEW PRODUCT IDEAS!

The wire fabrications shown here, highly developed specialties of National-Standard, are available in many types and sizes. Each can be produced in any metal that can be drawn into wire.

These materials are used in numerous products today for many different reasons... for strengthening, stiffening, protection, safety, decoration,

filtering, screening, heat or electrical conductivity, grounding, etc., etc.

Can one of these materials meet a present or new product requirement of yours? You'll never find an organization more cooperative or better qualified to help you fully explore any such ideas. Just get in touch with National-Standard, Niles, Michigan.

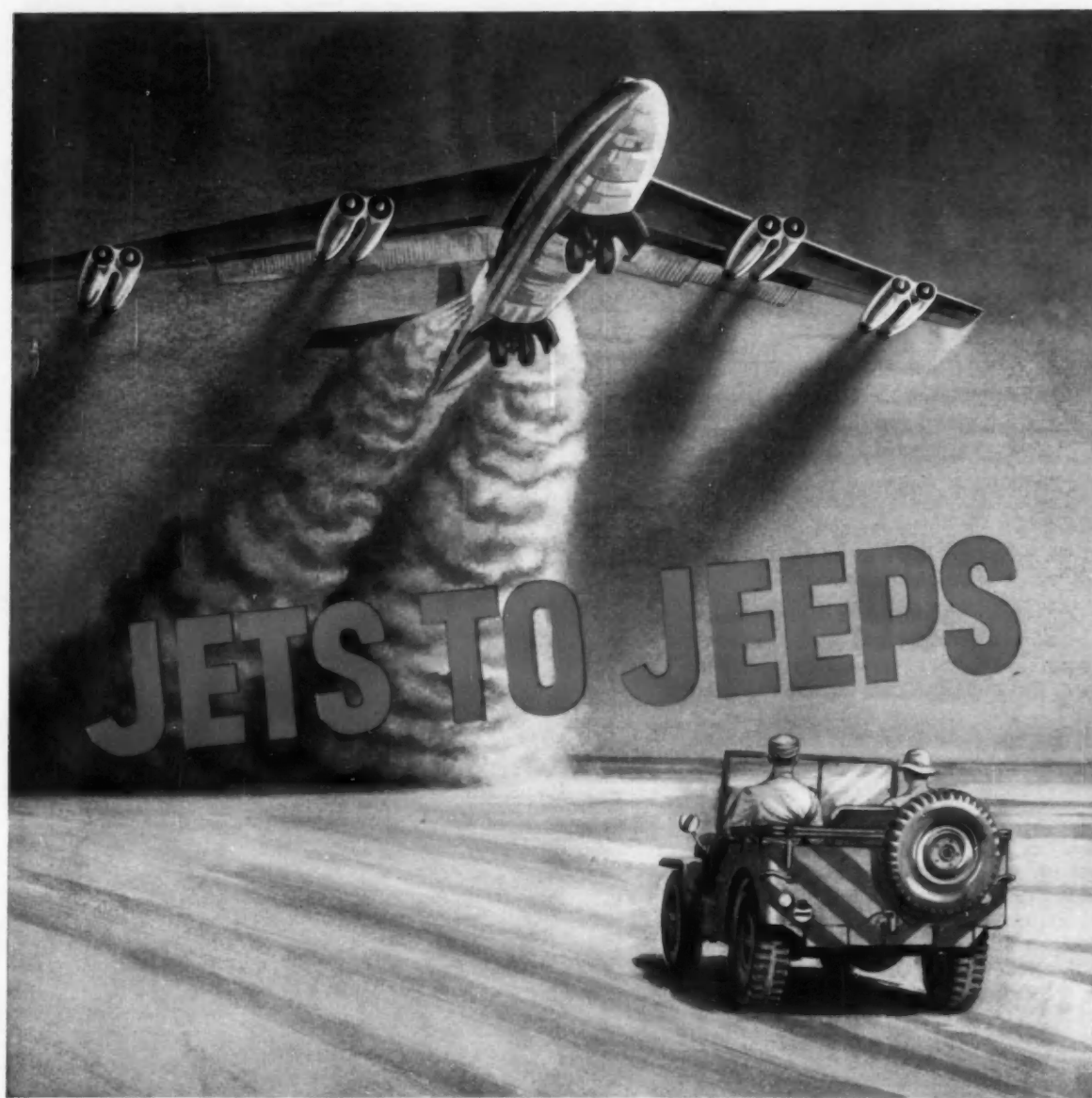
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From the screaming jet hurtling through the sky . . . gulping fuel by the gallon . . . to the rugged, little jeep rolling over the roughest, toughest terrain . . . every machine depends on engine protection to fulfill its mission. In every application where the pay-off is performance . . . FRAM Filters fill the bill!

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**FRAM** *oil-air-fuel-water* **FILTERS**

## Splices support All-Pro Tackle Lou Groza

The four corner splices in this extruded rubber windshield weather-strip produced by Ohio Rubber are strong enough to fully support 252-lb. All-Professional League Tackle Lou Groza of the Cleveland Browns, plus all his football gear.

Each of the four splices is a corner molded into an extruded weather-strip for perfect fit without tension. Neatness of splice, as well as strength, is an important factor because of the weather-strip's ultimate use in an automobile windshield assembly.

This ability to incorporate desired strength as well as neat appearance into splices is typical of ORCO's "customengineering" of parts made from rubber, synthetic rubber, silicone rubber, polyurethane and flexible vinyl, whether they be molded, extruded or bonded to metal or other material.

ORCO's integrated research, design, electronically controlled mixing and production facilities assure component uniformity and quality to meet the most exacting requirements. Why not check with ORCO engineers on your very next rubber or vinyl component problem and see for yourself how ORCO CUSTOMEERING can work to your greater advantage.



Send for  
free booklet  
"Component  
CUSTOMEERING  
rubber and vinyl parts".



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**WILLOUGHBY, OHIO**

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Stainless** STRIP STEEL

You can't tell the age of a car by its stainless steel!  
After a thousand or *two hundred thousand miles* of driving, Superior Stainless gleams good as new.  
● Enjoy the beauty of stainless on the cars *you* buy —costs you nothing in care, gives you everything in pride and pleasure!

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DIVISION OF

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For Export: Copperweld Steel International Company, New York

(Advertisement)

# Chemical Prepaint Treatments for Metal Surfaces

What they do, the types available, how they are applied



By J. H. GEYER  
Manager, Product  
Development Dept.,  
AMCHEM  
PRODUCTS, INC.

Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

The prepaint preparation of the metal surface is therefore a highly important part of the system. Chemical prepaint treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

Basically, there are four types of chemical prepaint treatments. These are phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate. Each is discussed briefly in the following paragraphs.



## Phosphoric Acid

Perhaps the most widely used and certainly one of the most economical chemical prepaint treatments is the phosphoric acid cleaner combination materials. ACP Deoxidine® is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit

underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.



## Iron Phosphate

Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances such as water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine®, ACP's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.



## Zinc Phosphate

ACP Granodine® is an example of this type of chemical prepaint treatment process, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, and acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the

paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. ACP Lithoform® is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.



## Amorphous Phosphate and Chromate

These coatings are the films produced by the ACP Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, mechanical spraying, or roller coating equipment. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip, spray or roller coating application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a de-oxidizer in the line is needed.

The major chemical prepaint treatments for metals have been covered briefly in this article. More complete information can be had by contacting an ACP sales representative or by writing us at Ambler, Pa.

**Amchem Products, Inc.**  
**Ambler 24, Pa.**



Formerly  
AMERICAN CHEMICAL PAINT COMPANY  
DETROIT, MICH. • ST. JOSEPH, MO.  
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New Chemical Horizons for Industry and Agriculture



Hydraulic Impulse Machine "road-tested" Morse Timing Chain and other chains at the equivalent of 95 mph. For results, see below.

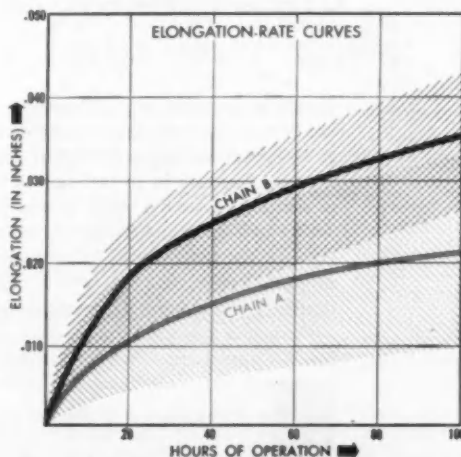
## Hundred-hour "stretch test" at 95 mph proves Morse Timing Chain 24% better!

**In lab test at 4000 rpm under 90-lb load  
Morse Timing Chain elongates 24% less  
than second-best timing chain**

The graph at right shows how Morse Timing Chain resists elongation better, even under severest operating conditions. No wonder Morse Timing Chain has been specified for over 80,000,000 car engines.

Today's high-horsepower engines demand split-second timing for top performance. So Morse builds each timing chain like a fine watch; inspects it carefully with modern equipment to insure *extra* thousands of trouble-free miles.

For original equipment or replacement timing chains, it pays to contact Morse *first*. Get full information and practical engineering help. Call, write or wire today: MORSE CHAIN COMPANY, DETROIT, MICHIGAN; ITHACA, NEW YORK. Export Sales: Borg-Warner International, Chicago 3, Illinois.



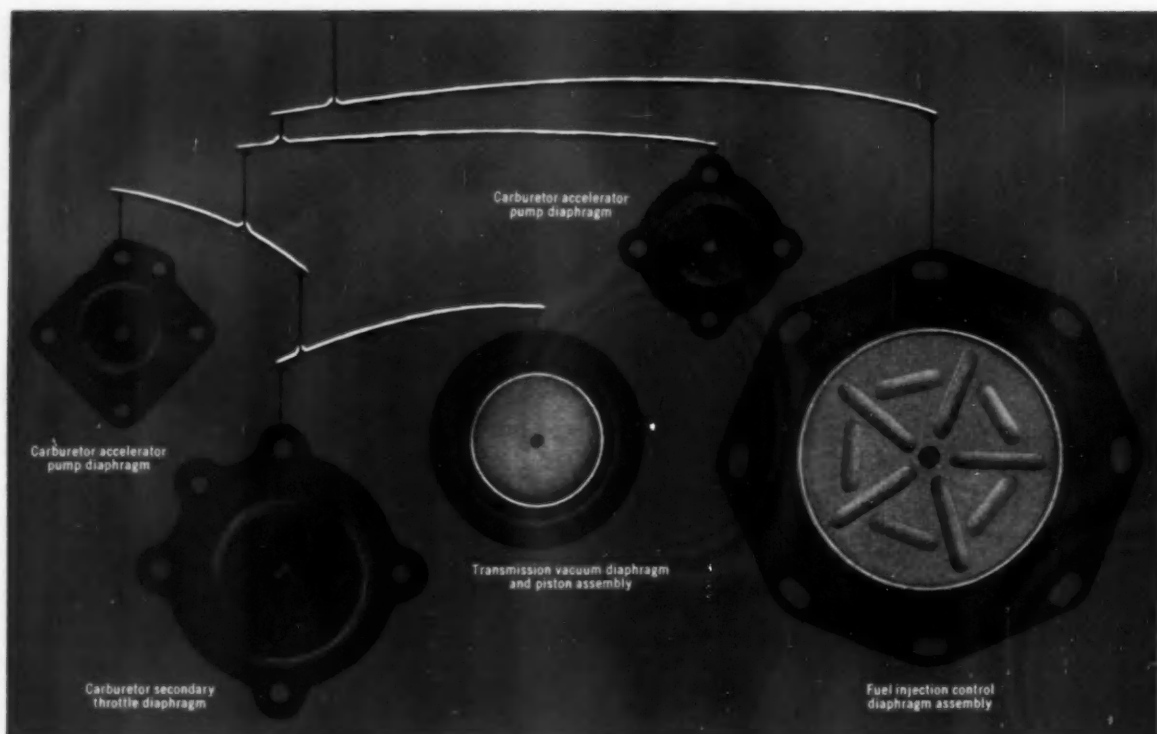
Morse 53-121 Timing Chain (A) showed 24% less elongation than other chain (B), after 100 hours at 4000 rpm under a 90-lb. load on the Hydraulic Impulse Machine—a very severe test that has been correlated with road and dynamometer test runs.

**SERVING THE AUTOMOTIVE  
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Simple or complex, your diaphragm problem can be solved quickly, dependably with the help of C/R Sirvene engineers. Their specialized experience gained in the solution of hundreds of similar problems is yours to use. They will design and compound the correct elastomers to produce the exact degree of hardness, tensile strength, compression set, volume change and flexibility you require. Temperature resistance, with various materials, ranges from  $-100^{\circ}$  to  $500^{\circ}\text{F.}$ , and compatibility with an equally

broad range of fluids, gases and solids, including petroleum base fuels and synthetic hydraulic oils can easily be achieved.

Whether you specify critical tolerances, exact concentricity or flawless bonding—the more reason to assign full responsibility to C/R Sirvene engineers. They'll assure the absolute uniformity and quality of your diaphragm straight through production. Define your diaphragm problem to us and see how we can help.



Write for your copy of the illustrated Diaphragm Bulletin SD-100.

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**CHICAGO  
RAWHIDE**



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## Here's how tracing will help you save

The simple, basic setup shown above handles nearly 300 different parts for a well-known manufacturer of drive line components. All work is performed on one Gisholt MASTERLINE No. 4 Ram Type Turret Lathe with a JETracer on the rear of the cross slide. Standard tools on the hex and square turrets are used to face, chamfer and reduce the stock while the JETracer finishes all diameters, steps, blends and radii. The 6 $\frac{1}{2}$ "-long, 2"-diameter stepped shaft (above at left) is typical and is completed in two operations with total f.t.f. time only 4.95 minutes.

### Here are just a few things the JETracer can do for you:

- Shorten setup and change-over time
- Simplify machining and eliminate operator errors
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- Reduce inspection time (only one length and one diameter need checking)

Minimize or eliminate secondary operations (through finer finish, greater accuracy)

Increase production through automatic machining of complex surfaces

Free operator to handle extra units or perform other work

Gisholt has developed a complete line of JETracers for use with ram and saddle type turret lathes, automatic turret lathes and single-spindle chucking lathes. These include rear cross slide, turret and independent slide mounted units, single or multi-pass types. All are designed to operate at full capacity of the machines to which they are applied, without limiting machine functions or restricting the use of standard tools.

You'll want to see for yourself how the JETracer adds flexibility, speeds operations and cuts costs on standard and problem parts. Send the coupon today for your free copy of the new JETracer catalog, or call your Gisholt Representative for complete information.

# GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

**ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE**

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Please send a copy of the new Gisholt JETracer catalog.

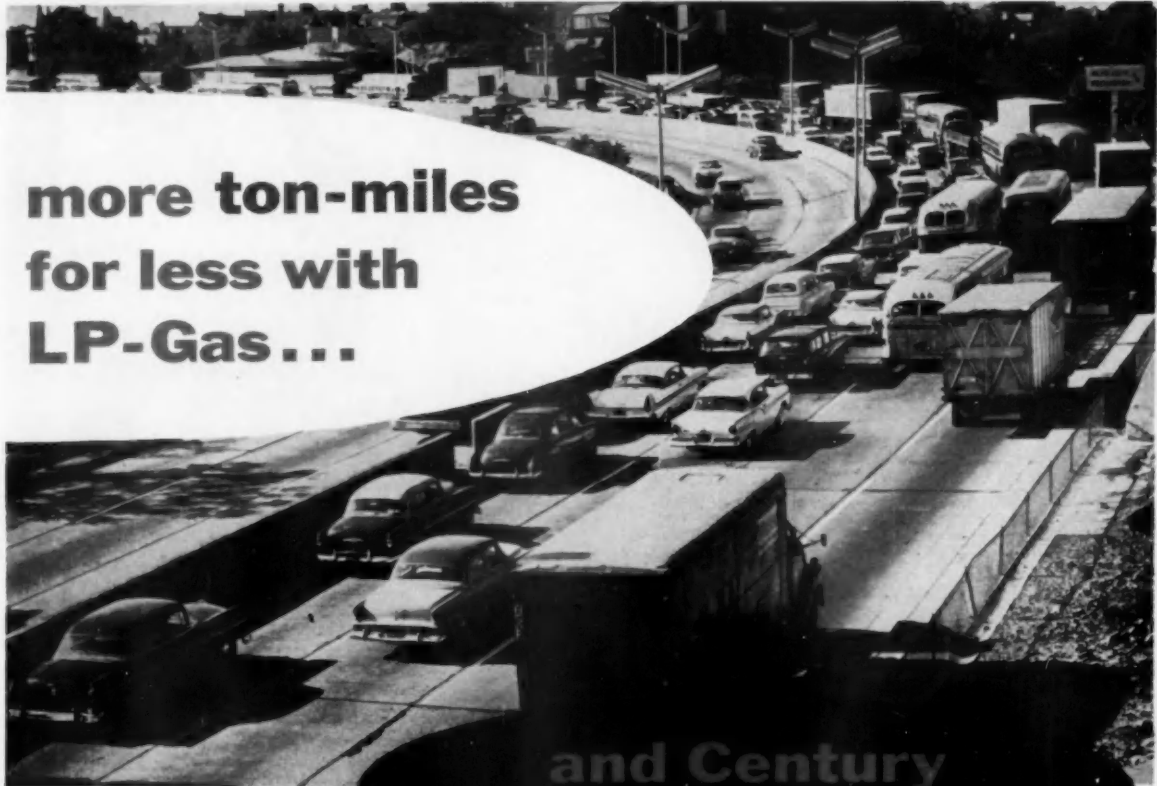
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City..... Zone..... State.....





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Century 3C Carburetors are individually designed for each make of engine, and they are factory-calibrated and pre-set to its performance curve. You get easy starting, perfect idling, constant power and speed in all operating conditions.

Century 3C Carburetion, a product of Borg-Warner, employs a metering valve system to provide perfect fuel-air mixtures at all throttle settings. Performance is not dependent upon delicately adjusted, spring operated pressure regulators. That's why only a tune-up adjustment is required when installing a Century—you just set it, seal it and forget it.

Get the facts! Write for booklet titled, "How Truckers Save on Fuel, Lubrication and Maintenance."



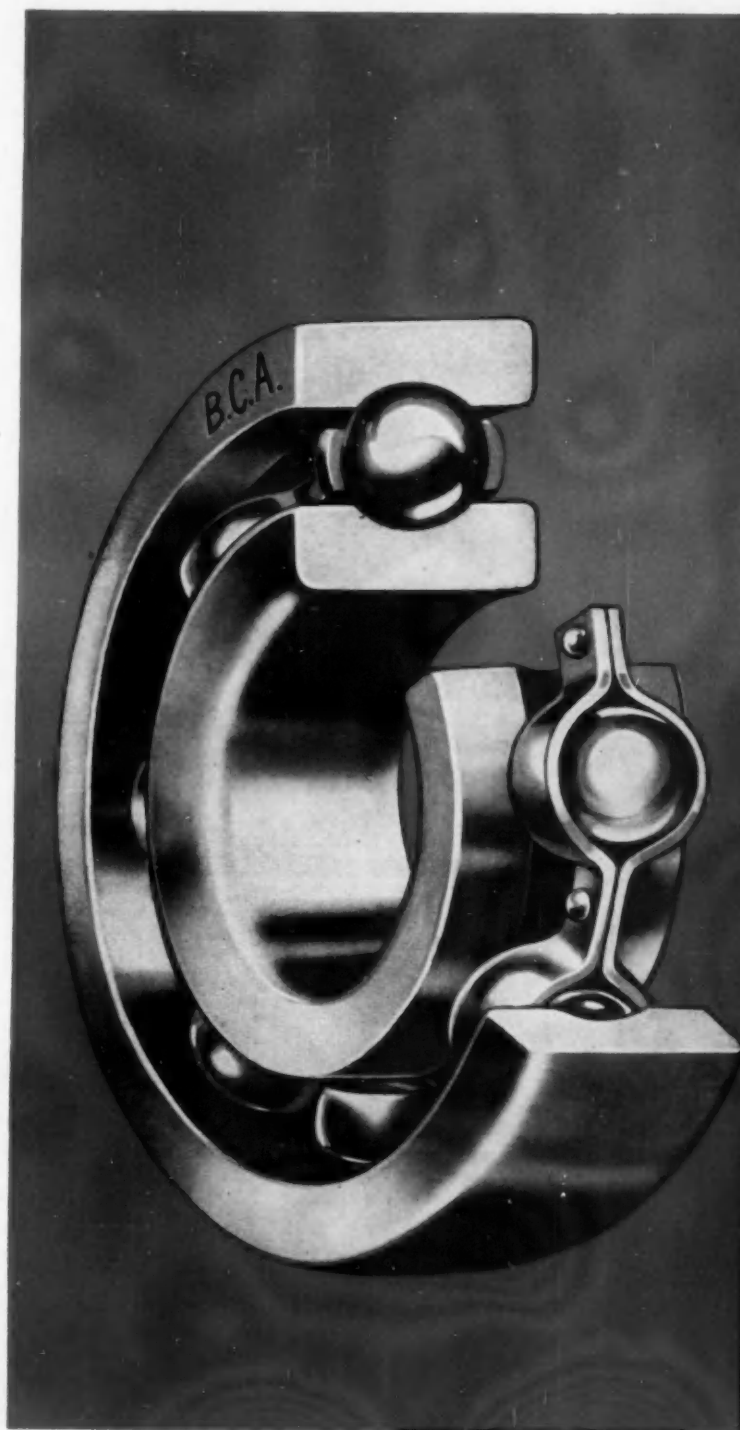
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**Federal-Mogul-Bower Bearings, Inc.**



Right, 1/2-in. pitch,  
1 1/16-in. wide  
timing chain

# This narrower timing chain has saved **MILLIONS** of dollars for leading car makers

*It's one of the reasons why so many  
automotive designers are turning to  
LINK-BELT 1/2-inch pitch timing chain*

SAVING even a fraction of an inch of car length can mean a substantial reduction in production costs. And by permitting use of narrower sprockets, shorter camshafts, crankshafts—and cutting overall length, where desired—Link-Belt 1 1/16-inch width timing chain has brought significant economies to many car manufacturers.

Originated by Link-Belt in 1949, this narrower, 1/2" pitch design has been adopted by more and more leading auto makers. And the fact that it has accommodated a better-than-100% horsepower increase on some engines testifies to its exceptional durability.

For more complete information, write for Book 2065.

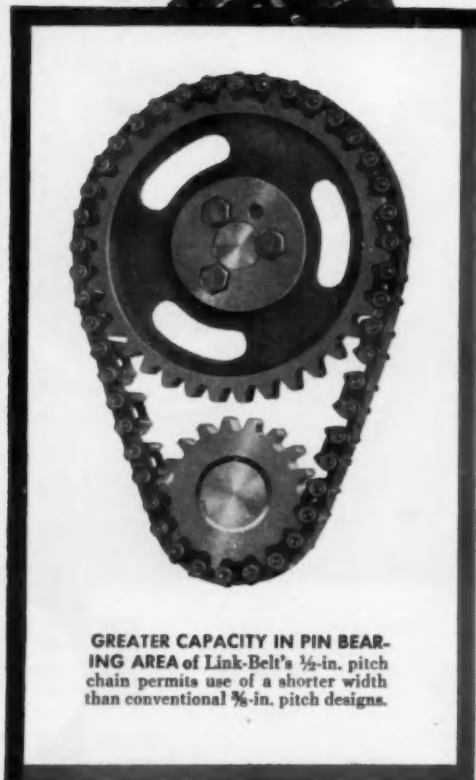


**TIMING CHAINS AND SPROCKETS**

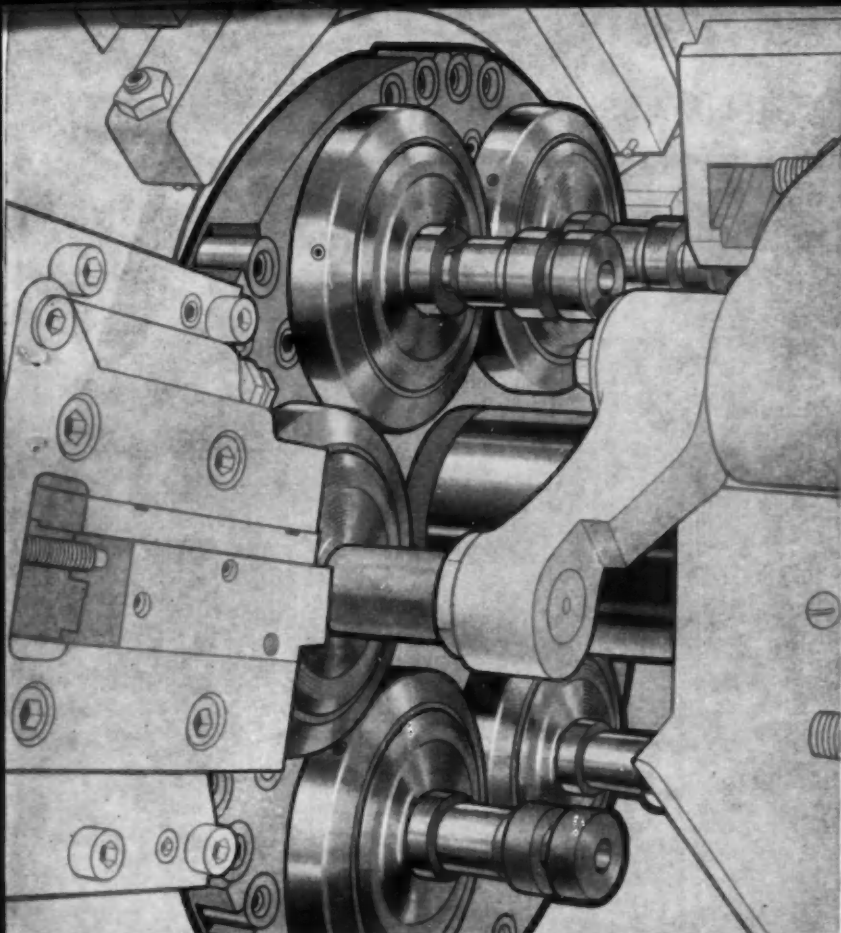
LINK-BELT COMPANY: 220 South Belmont Ave.,  
Indianapolis 6, Ind.

14,500

Circle 180 on Inquiry Card for more data



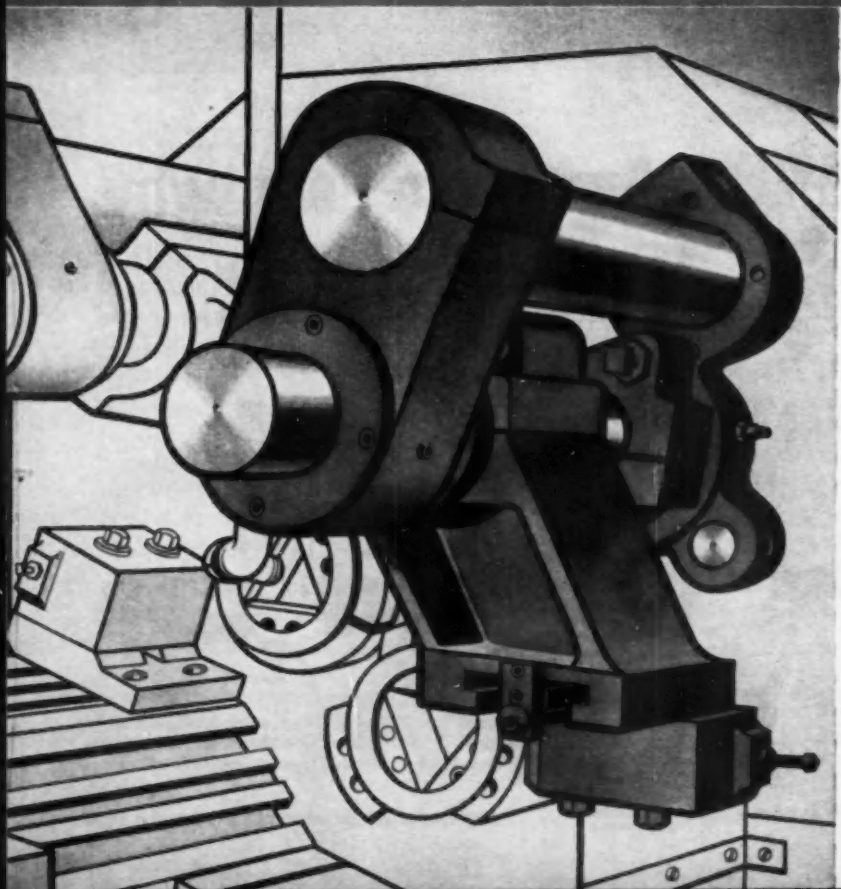
**GREATER CAPACITY IN PIN BEARING AREA** of Link-Belt's 1/2-in. pitch chain permits use of a shorter width than conventional 3/4-in. pitch designs.



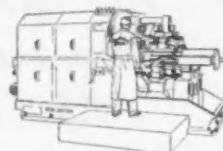
*Look at New Britain's*  
**new automatic  
bar machines**



The widest range of spindle speeds  
among machines of comparable ca-  
pacity and accuracy.



*Look at New Britain's*  
**exclusive  
chucker arms**

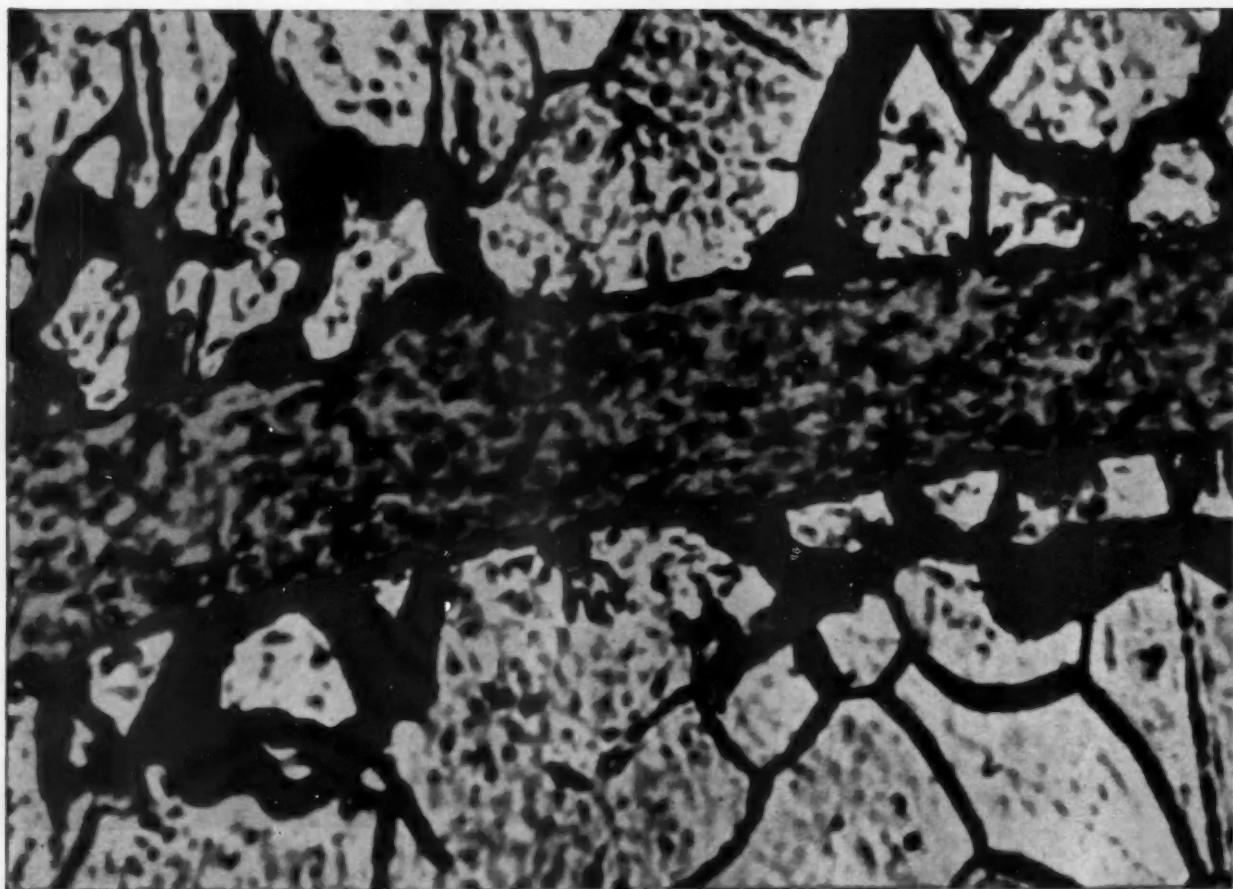


All the ruggedness of a cross slide,  
but with two-way motion for cut-  
ting O.D.'s, I.D.'s, tapers and radii  
and for recess boring, in addition to  
facing cuts. New Britain-Gridley  
Machine Division, The New Britain  
Machine Company, New Britain,  
Connecticut.

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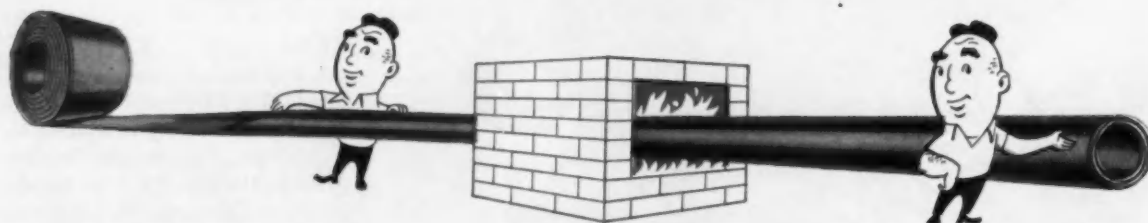


## WHY BUNDY LEADS IN MASS-FABRICATION:



## COPPER BRAZING...Another reason why

And Bundyweld can be mass-fabricated even in the most complex shapes—at a low unit-cost which results from three Bundy advantages:

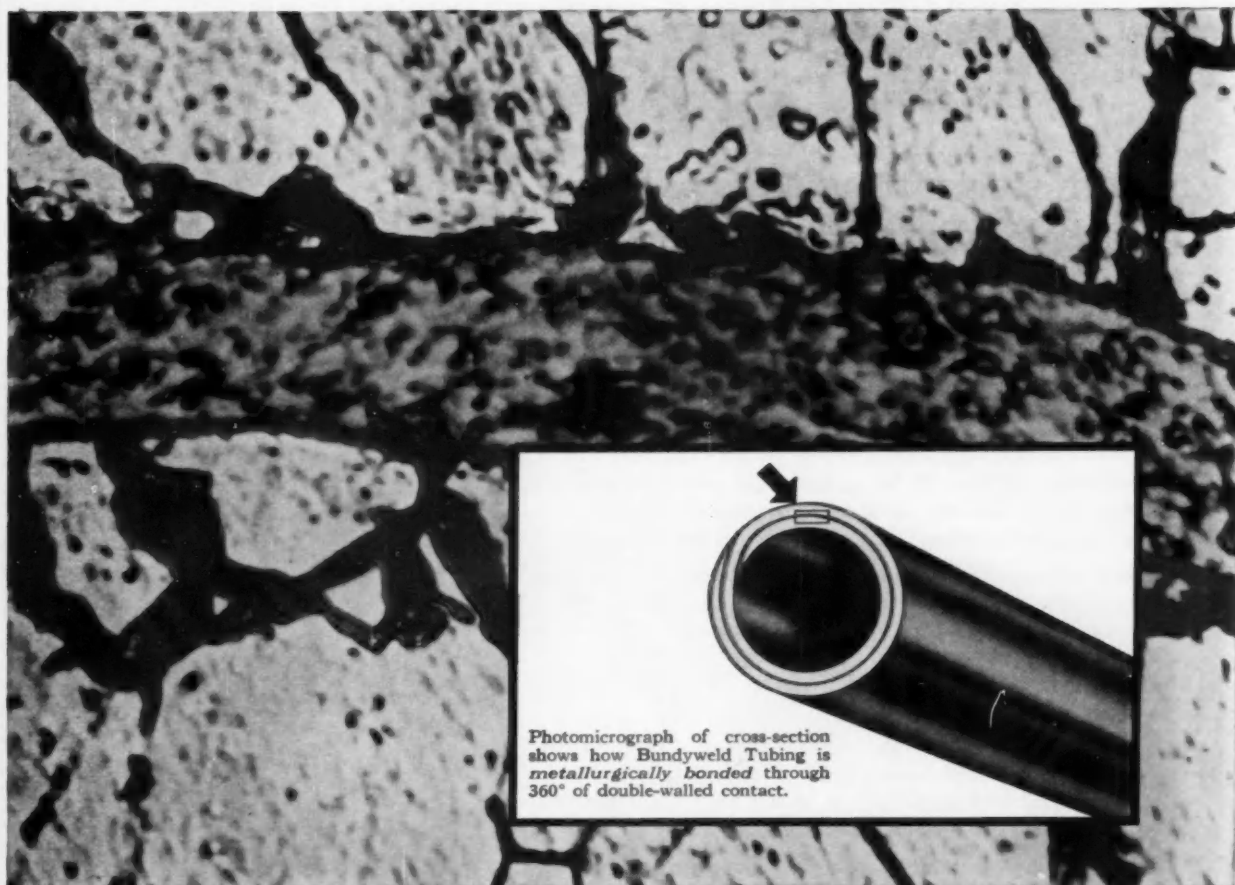


Bundyweld starts as a single strip of copper-coated steel. Then it's continuously rolled twice around laterally...

into a tube of uniform thickness, and passed through a furnace where copper coating fuses with basic steel.

Result: Bundyweld Tubing—double-walled, beadless, metallurgically bonded through 360° of wall contact.





Photomicrograph of cross-section shows how Bundyweld Tubing is *metallurgically bonded* through 360° of double-walled contact.

## Bundyweld prevents hydraulic leakage

This tubing was passed through a furnace where its copper coating *fused* permanently with base steel. It's just one of three reasons why Bundy® leads in the modern art of mass-fabrication.

**Bundyweld Tubing®** is copper-brazed to stay *leak-proof by test*. It stands up through brutal shock and punishing vibration . . . still handles high-pressure hydraulics with perfect safety. No wonder Bundyweld is used on 95% of today's cars, in an average of 20 applications each.

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**WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY**

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Trim steelcutting costs with Carboloy® Extra-Performance Grades 330, 350, and 370, and low-cost, General-Purpose Grades 78 and 78B

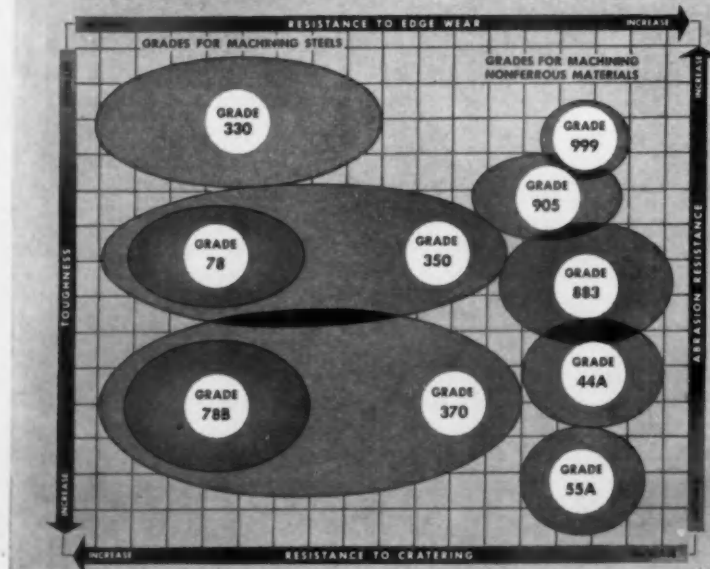
Some steelcutting jobs call for extra-tough, extra-performance carbides. Others can only be handled profitably with low-cost, general-purpose carbides. That's why we make them *both*.

Where you need increased machine productivity and have long production runs, to keep cost-per-piece low use Carboloy Extra-Performance Series 300 carbides. Their added strength and stamina handle jobs ranging from heavy roughing to high-speed finishing . . . at a cost and rate no "premium" carbide on the market can beat.

But, for general-purpose steelcutting jobs that don't require the Extra-Performance carbides, use Carboloy Grades 78 and 78B. Their top-notch performance, at low initial tool cost, will keep your machines operating profitably.

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This complete team of Carboloy cemented carbides gives you more for your carbide tool dollar!



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Cut nonferrous materials  
with low-cost Carboloy<sup>®</sup>  
Grades 44A and 883 . . .  
get longer tool life,  
increase production rates

These Carboloy cemented carbides are performance-matched to your cutting job for optimum machine productivity.

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There are 5 Carboloy cemented carbides for cutting non-ferrous materials, including Grades 44A and 883. One of these is designed especially for the particular characteristics of your cutting job to give maximum tool efficiency. Job-matched performance of these Carboloy nonferrous grades means better value for your cutting dollar.

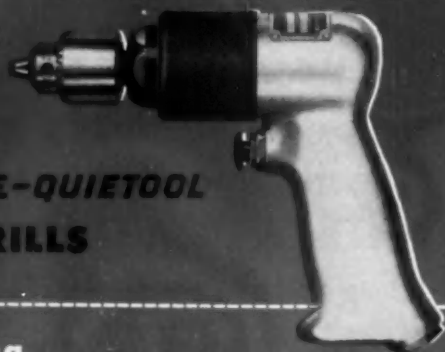
*To find out more about Carboloy Extra-Performance and General-Purpose carbides, or low-cost nonferrous grades, call or write: Metallurgical Products Department of General Electric Company, 11157 E. 8 Mile Boulevard, Detroit 32, Michigan.*

**CARBOLLOY<sup>®</sup>**  
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GENERAL  ELECTRIC

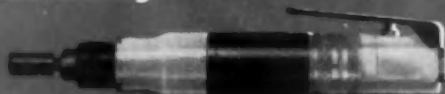
**tools, not tranquilizers!!!**

**for drilling**



**BUCKEYE-QUIETOOL  
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Air tools are built for working, not for sleeping. Even the amazingly muffled Buckeye QUIETOOL drills, sanders, screwdrivers and nutrunners won't lull you to sleep! But they do their work with precise efficiency, and make less exhaust noise in the process than you ever believed possible of an air tool.

How come? Because in designing these new tools, we included the muffler as an integral part, designed into the tool from the start.

There are many more reasons why these new Buckeye tools operate so quietly, stuff about decibels, sones, microbars, etc. . . . but you'll be more interested in the results than in how we came by them.

A letter or postcard, with your name, your company name and address, and the single word QUIETOOL, will bring complete information and, if you like, an obligation-free trial-test right in your own plant.

#### Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

For a special air tool for a difficult job, or a standard air tool for routine work, your best buy is Buckeye. Write for our new catalog.

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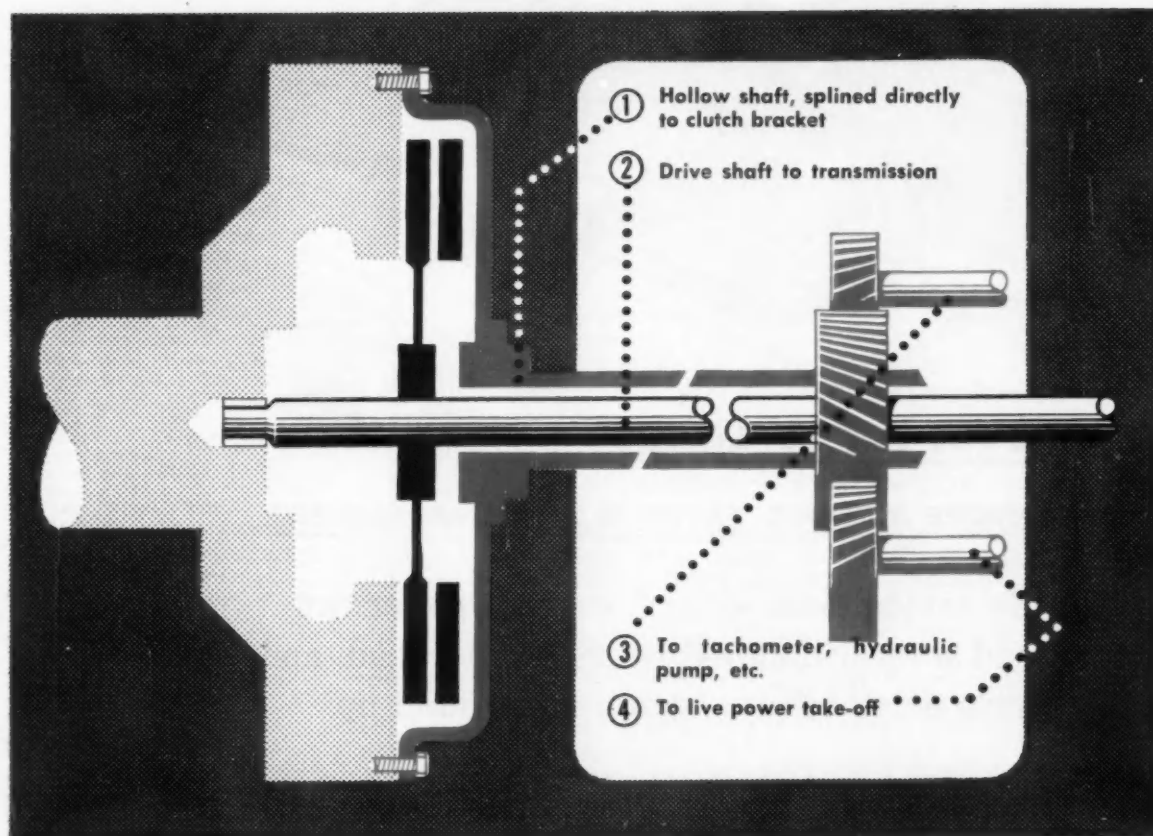
## CALENDAR

OF COMING SHOWS AND MEETINGS

- National Conference on Industrial Hydraulics, Hotel Sherman, Chicago, Ill. . . . .Oct. 16-17
- American Society of Industrial Designers, annual design conference and meeting, Bedford Springs, Pa. . . . .Oct. 18-21
- National Rubber & Plastics Instrumentation Symposium, sponsored by Instrument Society of America, Akron, O. . . . .Oct. 20-21
- SAE National Transportation Meeting, Lord Baltimore Hotel, Baltimore, Md. . . . .Oct. 20-22
- National Management Association, annual meeting and national conference, Statler-Hilton Hotel, Los Angeles, Calif. . . . .Oct. 20-24
- SAE National Diesel Engine Meeting, Lord Baltimore Hotel, Baltimore, Md. . . . .Oct. 22-24
- American Vacuum Society, fifth national vacuum symposium, Sir Francis Drake Hotel, San Francisco, Calif. . . . .Oct. 22-24
- American Society of Body Engineers, annual technical convention, Rackham Memorial Bldg., Detroit, Mich. . . . .Oct. 22-24
- International Motor Show, Earls Court, London . . . . .Oct. 22-Nov. 1
- Aeronautical and Navigational Electronics, annual East Coast Conference, Lord Baltimore Hotel, Baltimore, Md. . . . .Oct. 27-28
- National Lubricating Grease Institute, 26th annual meeting, Edgewater Beach Hotel, Chicago, Ill. . . . .Oct. 27-29
- American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. . . . .Oct. 27-29
- National Metal Exposition and Congress, Cleveland Public Auditorium, O. . . . .Oct. 27-31
- Ultrasonic Manufacturers Association, annual meeting, Hotel Cleveland, Cleveland, O. . . . .Oct. 28
- Computer Applications Symposium, fifth annual meeting, Morrison Hotel, Chicago, Ill. . . . .Oct. 29-30
- International Symposium on Plastics Testing and Standardization, Benjamin Franklin Hotel, Philadelphia, Pa. . . . .Oct. 30-31
- SAE National Fuels and Lubricants meeting, The Mayo, Tulsa, Okla. . . . .Nov. 5-6
- Society of Vacuum Coaters, fall meeting and technical conference, Hotel Statler, Detroit, Mich. . . . .Nov. 5-6
- Industrial Management Society, annual industrial engineering and management clinic, Hotel Sherman, Chicago, Ill. . . . .Nov. 5-7
- National Machine Tool Builders' Association, annual meeting, The Homestead, Hot Springs, Va. . . . .Nov. 5-7
- Automobile Show, Turin, Italy. . . . .Nov. 5-16
- Manufacturing Chemists' Association, 8th semi-annual meeting and winter conference, Hotel Statler, New York City . . . . .Nov. 25



# SPICER SPLIT-TORQUE CLUTCH provides a second and continuous source of take-off power



The Spicer Split-Torque Clutch delivers power to two shafts . . .

- One is the drive shaft — the same as you'll find in a conventional transmission. As usual, power is controlled by engaging and disengaging the clutch.
- The other is a concentric hollow shaft splined to the clutch bracket. Since the bracket is bolted to the flywheel, power is continuous whenever the engine is running.

AS IT'S NOW EMPLOYED by one tractor manufacturer, the concentric outer shaft provides power for a continuously operating hy-

draulic pump and a live PTO shaft. And, there's almost no limit to the number of accessories and PTO drives that can be powered by the Spicer Split-Torque Clutch.

In by-passing the clutch plate with a source of continuous power you make your tractor more efficient . . . more profitable . . . simpler to operate. That's why the Spicer Split-Torque Clutch is a sales feature in itself.

Investigate the advantages of the Spicer Split-Torque Clutch before you finalize your design. The Dana engineer will be glad to show you how its second source of power can be used to best advantage.



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**AVIATION:** Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merrifield, Ontario.

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## High Spots of This Issue

### ▼ Pontiac and Chevrolet

Pontiac launched its 1959 line with entirely new bodies mounted on a redesigned frame. Other changes include a larger V-8 engine with a new shell-molded crankshaft, and a new rotary valve, inline power steering gear (page 50). Chevrolet enters the new car year with a completely restyled line, which includes the Impala, the Bel Aire, the Biscayne, station wagon, and the two-passenger Corvette (page 58).

### ▼ Ford Cars and Trucks

An entirely new Ford-O-Matic transmission of two-speed design is perhaps the most important change in the Ford 1959 passenger car line (page 54). In trucks Ford is featuring four-wheel drive models, new tilt cab tandems, and a new four-speed auxiliary transmission (page 56).

### ▼ Plymouth and Dodge for 1959

Details of the completely restyled Plymouth, the new Dodge passenger car, and the complete line of Dodge trucks—including the new Sweptline pickups—are given on pages 57, 60, and 61, respectively.

### ▼ The Lag in Automotive Uses of Plastics

A panel of experts at the Detroit Meeting of the Society of Plastics Engineers debated the failure of plastics to make greater inroads in the automotive industry. Their answers are summarized here. Page 52.

### ▼ Improved Fuel Injection

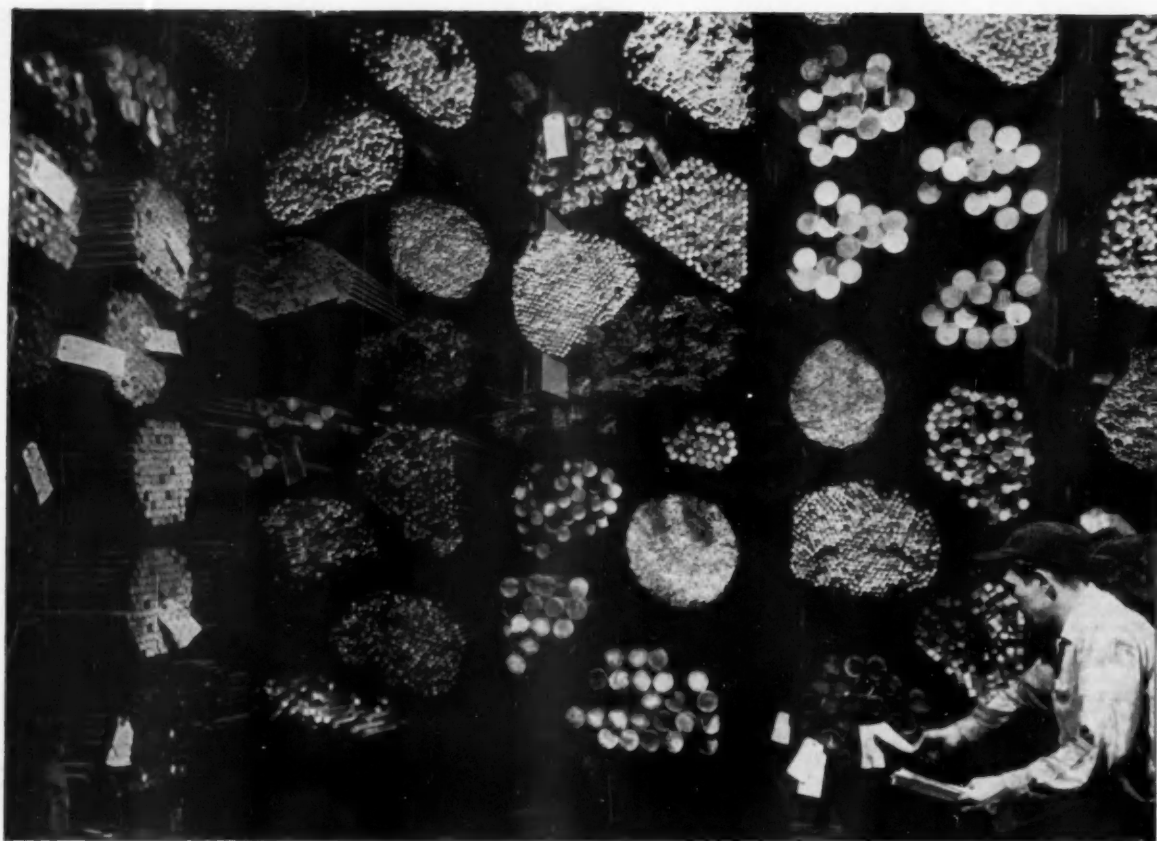
Daimler-Benz developed a fuel injection system that employs a two-plunger injection pump driven by a double cam running at half-engine speed. Main operating features of this unusual system are described here. Page 63.

### ▼ 57 New Product Items

#### And Other High Spots, Such As:

ARS missile program; construction industry trends; aluminum valves; SAE Milwaukee meeting; metal show preview; and industry statistics.

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# News

## OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 119, No. 8

October 15, 1958

### Ford Alters 1959 Car Engines To Improve Gasoline Economy

Ford Div. is taking a significant step with its 1959 line of automobiles—for the first time in many years, engine compression ratios and horsepower are being reduced.

This move, according to Ford Div. spokesmen, will result in greater operating economy with 1959 models. Only the optional 352 cu in. engine, which accounts for just 5 per cent of total sales, will require premium fuel, says Andrew A. Kucher, Ford Motor Company vice president-Engineering and Research.

Kucher says the power loss in Ford's standard engines is made up for in more efficient fuel combustion, changes in the rear axle ratios, and changes in spark advance.

The Ford engineer made his disclosures at the national press showing of the 1959 Ford line earlier this month in Detroit.

Improved fuel metering, lengthened piston skirts, and better crankcase ventilation contribute to the economy factor of the '59 standard engines, he added.

At the same time, J. O. Wright, company vice president and division general manager, gave the first concrete admission that Ford is ready to move with its small car.

"If Ford decides to introduce a small car, we know now precisely what we would produce, right down to the last detail," he stated.

Further indication that the small car plans are firm came when he said that Ford has no intention of letting competition get the jump. This could mean that Ford has some stop-gap car planned to meet GM's small car entry until production of the regular unit can get started.

Wright also told the press gathering that Ford is convinced that styl-



### LARGER ENGINE OFFERED WITH THUNDERBIRD

Ford Motor Co. is offering the 430-cu in. V-8 engine as optional equipment on the 1959 Thunderbird. Fitted with a four-barrel carburetor, this engine delivers 350 bhp at 4800 rpm, and has a torque of 490 lb/ft at 3100 rpm. Compression ratio is 10 to 1. Styling and mechanical features of the Thunderbird remain about the same as for the 1958 model, except for numerous refinements.

ing will play a major role in the decision-making of the 1959 car buying public.

"We are betting our all on the good taste and good sense of the public in 1959," he said.

He explained that Ford research studies show that a "growing group of discriminating purchasers" want more restraint, more economy, more real quality and better taste in automobiles.

Wright said that Ford's 1959 styling concept of "classic simplicity" is "tasteful and functional" as opposed to the "brassy ostentation" of competition.

### Bendix Forms Brazilian Firm, Looks for Further Expansion

Bendix has formed a new firm in Brazil to manufacture air, hydraulic and vacuum power brakes for automobiles and trucks. Meanwhile, the parent firm is negotiating for further expansion in other areas of the world

market in addition to South America.

The new firm is known as Bendix do Brasil Equipamentos Para Auto-veiculos, S.A., and is owned jointly by Bendix Aviation and Bendix-Westinghouse Automotive Air Brake Company. The company expects to be in production late this year at a new 165,000 sq ft plant at Campinas, near Sao Paulo.

Bendix currently is negotiating with 230 prospective licensees in foreign countries, covering a wide range of products in several Bendix divisions. There are now 180 Bendix overseas licensees, in addition to subsidiaries and affiliates in France, Brazil, Canada, England and Australia.

The new firm is an outgrowth of a recent Brazilian government decree that by 1960, vehicles manufactured and sold in Brazil must be at least 90 per cent national content, by weight. The ruling is expected to stimulate further investment of American capital in Brazil.

Harold R. Ohlheiser is president of the new firm.



# News

## AUTOMOTIVE AND AVIATION



### CHRYSLER POWERED BY NEW V-8 ENGINE SERIES

Chrysler cars for 1959 are powered by a new series of Golden Lion V-8 engines, as follows: the Windsor model is powered by a 383-cu in. engine which develops 305 bhp at 4600 rpm; the Saratoga, by a 383-cu in. engine, with four-barrel carburetor, which develops 325 bhp at 4600 rpm; the New Yorker, by a 413-cu in. engine, which develops 350 bhp at 4600 rpm; and Chrysler 300E, by a 413-cu in. engine, with two 4-barrel carburetors, which develops 380 bhp at 5000 rpm. Engine torque is 410 lb/ft at 2400 rpm for the Windsor; 425 lb/ft at 2800 rpm for the Saratoga; and 470 lb/ft at 2800 rpm for the New Yorker.

### Automobile Industry Optimistic About 1959 Sales, Employment

With the 1959 sales year just getting underway, automobile executives are agreed that 1959 will be a much better year for the industry than 1958.

Here are some reasons given by industry leaders for their optimism.

Harry A. Williams, managing director, Automobile Manufacturers Association, believes that deferred need and the good credit position of potential car buyers, as well as better business conditions, are strong factors making for an upturn.

Robert J. Eggert, Ford Motor Co. marketing research manager, bases his prediction of a 20 per cent sales increase over 1958 on such factors as disposable income, which is expected to reach an all-time high of \$325 billion in 1959; and the automobile installment debt, which is currently 6 per cent below the 1957 peak. Other factors: major product changes, including styling and better fuel economy, an increase in the number of "middle-aged" cars, and easier trade-ins.

J. B. Wagstaff, general manager, De Soto Div., lists three major reasons for a 1959 upturn: the public's improved attitude toward new car buying; the recent improvement in general economic conditions; and the

sweeping engineering and styling changes—the greatest since the fall of 1954.

Benson Ford, vice-president of Ford Motor Co., maintains that with the economy on a strong upswing, hundreds of thousands of potential buyers who drove old model cars a year longer will be lured back into the market by such intangibles as style, performance, and the prestige of new-car ownership.



### 1959 IMPERIAL FEATURES MORE POWERFUL ENGINE

The 1959 Imperial is powered by a new Imperial 413-cu in. V-8 engine that develops 350 bhp at 4600 rpm and has a torque of 470 lb/ft at 2800 rpm. Bore and stroke are 4.18 and 3.75 in., respectively. Optional features include: A stainless steel roof for hardtop models, swivel front seats, rear air suspension, pushbutton controlled heater-air conditioning unit, and electronically controlled rear-view mirror and headlight beam changer.

### Edsel Will Cut Price in 1959; Mercury Offers All-New Car

Edsel prices and models will be cut back in 1959 in a move aimed to give the car a definite place in the lower middle-price field.

At the same time, Ford Motor Company's MEL Div. is bringing out an all-new Mercury for 1959 to give that car a stronger position in the upper segment of the medium-price market.

Ben D. Mills, Ford vice president and MEL general manager, said the new Edsel will be priced "just above the low-priced three." One MEL official, speaking at the press showing of the division's 1959 products, said some of the Edsel models will be priced to compete with the Ford Fairlane 500, Plymouth Fury and Chevrolet Impala.

Mills admitted that Edsel covered too broad a price range in 1958, its first year on the market. He said the price structure made it difficult for the average buyer to say just where the car fit.

So Edsel has reduced its model lineup, as predicted earlier in AI, from four series to three. In 1959 Edsel will have the Ranger and Corsair series and the Villager station wagons.

Mercury, on the other hand, is aiming at a more exclusive position in the medium-price range with an all-new car. Mercury will drop the Medalist series to concentrate on the higher priced Monterey, Montclair and Park Lane series and the Country Cruiser station wagon.

Mercury is making advertising fodder of the fact that no other middle-priced car has a body all of its own, not shared by a lower-priced car.

Even the Edsel, which in 1958 used



the Mercury body for two series and the Ford body for the other two, is sharing a body with a low-priced car, the Ford.

Two models have been added to the Continental Mark IV line for 1959, a town car and a limousine. Available only in black, these prestige cars will carry padded landau tops, luxurious interior decor and high price tags.

Edsel will offer a 145-hp economy six-cylinder engine. Three other V-8 engines will range up to 303 hp. Mercury will have an economy V-8 plus three other V-8 engines, topped by the 345-hp engine in the Park Lane series.

In 1958, the top horsepower engines for Edsel and Mercury were 345 and 360 respectively.

Mills said MEL Div. spent \$138 million to develop and make ready the new Mercury, Edsel and Lincoln automobiles.

A good share of this money went into the Mercury program. The new wheelbase is up to four in. longer, the engine and transmission have been moved forward and the floor pan lowered. With a 35 per cent greater total glass area, a compound windshield and larger rear light, the car has a completely different profile.

Walker Williams, MEL assistant general manager, pointed out that by moving the engine and transmission forward and the drive train down, the floor tunnel has been lowered by 50 per cent, providing more room for the center seat passengers.

While previewing the '59 MEL line, Mills also referred to the English Ford and German Taunus small car lines, which his division handles in this country. He said that during the coming year, MEL hopes to sell 35,000 of the English imports and 3500 Taunus cars.



#### GERMAN CAR HAS FRONT WHEEL DRIVE

*Independent rear suspension by trailing A-shaped arms is a feature of the front-wheel-drive Alexander TS built by Lloyd Motorenwerk, Bremen, Germany. The restyled body has the outer panels bolted to the main assembly to facilitate replacement when damaged. Power output of the 36.4-cu in. overhead camshaft air-cooled engine is raised to 25 hp at 5000 rpm by an improved induction system and higher compression.*

#### Chevrolet Div. Expands Impala Series and Drops Delray Line

Chevrolet announced it has added two models to its Impala series—a four-door hardtop and a four-door sedan—and dropped the Delray series in what appears to be a move to capture a more profitable segment of the so-called low-priced market.

At the same time, E. N. Cole, GM vice president and Chevrolet general manager, predicted his division will take at least 28 per cent of a total new car market of 5.5 million automobiles.

In general, Chevrolet has a completely new car with new styling that resembles the "thin line" of the other GM cars. New to the line are an economy six-cylinder engine, improved

brakes with larger braking surfaces and increased glass area.

And there is an interesting regression: Chevrolet has brought back the manual shift with the gear shift lever on the floor. A four-speed synchronized transmission is being offered as an option with V-8 engines "to restore a little of the fun in driving," as Cole put it.

At Chevrolet's national press showing of the '59 line of cars, Cole made a tacit admission that Chevrolet already has purchased its tools and dies for a small car.

"But this does not mean," he was quick to add, "that we will purchase a single pound of productive material to run over those tools and dies."

Chevrolet is known to be ahead of Chrysler and Ford in its small car plan, and the present target date is believed to be a 1960 model for late 1959 introduction.

In addition to tools and dies, certain production gauges already have been ordered, further indicating that Chevrolet officials know what their small car is going to look like, and what its manufacturing tolerances will be.

Dropping the Delray series is a further step in preparation for the small car, as pointed out in *AI* (Aug. 1, 1958, p. 23). Before Chevrolet (or the other two divisions of the low-priced three) can bring out a smaller car, there must be a spot for it in the price and marketing structure.

Removing the Delray at the bottom widens the step between the Biscayne and the American Motors Rambler, Studebaker-Packard Lark, and the host of foreign small cars.



#### HILLMAN MINX POWERED BY LARGER ENGINE

*Hillman Minx for 1959 is powered by the larger 91.2-cu in. Rootes Group engine that develops 52.5 hp at 4400 rpm with 8.5 to 1 compression. Other changes include a bigger clutch, improved steering unit, and minor points of styling.*



### BRISTOL HARDTOP FEATURES ALUMINUM-PANELED BODY

The new Bristol 406 two-door hardtop, built by Bristol Aeroplane Co., features a restyled aluminum-paneled body supported by a steel frame, Dunlop disk brakes with adjusters on all wheels, an improved rear suspension incorporating longitudinal torsion bars, and an enlarged 135-cu in. engine. The six-cylinder power unit has inclined overhead valves operated by a linkage of pushrods and rockers. It develops 105 bhp at 4700 rpm and has a maximum torque of 129 lb/ft at 3000. Bore and stroke are 2.7 in. and 3.92 in., respectively.

### GM Car Prices Creep Upward; AMC Holds Ambassador Price

Four General Motors divisions announced 1959 car prices simultaneously last month. And the trend at General Motors, as elsewhere, is to higher prices.

Some models in the Cadillac and Pontiac lines, however, carry slightly lower prices for '59. In several instances there was no change.

At GM, the price increases range from \$10 for the Chevrolet Biscayne series to \$139 for the Chevrolet Nomad four-door station wagon. Chevrolet also increased the price on the two Impala models continued from 1958.

The picture at Pontiac is clouded by a shakeup of models and series so that comparisons in many cases are impossible. Where there are comparable models, however, the prices are the same as 1958 or from \$62 to \$209 lower than before.

Cadillac upped the price on the 62 coupe \$100, cut the price of the Eldorado Biarritz and Seville \$93, and left all other prices alone.

Oldsmobile raised the price of its 88 station wagon \$75 and all other models \$60.

American Motors, meanwhile, announced that the Ambassador V-8 prices for 1959 are unchanged. The price of Rambler American sedans was marked up \$43, and all 108-in

Rambler Six and Rebel models are up \$43 over 1958.

Ramblers range from \$1675 for the American Deluxe sedan to \$2862 for the Ambassador Custom hardtop station wagon. These are factory list prices, which do not include Federal, state, or local taxes, or transportation and handling charges.

### GM, Chrysler Join Ford In 3-Year Pact with UAW

A period of labor peace began this month when Chrysler and GM joined Ford Motor Company in signing three-year contracts with the United Auto Workers.

There were details to be worked out, but the big hurdle had been passed. Chrysler settled with the union Oct. 1, GM two days later. Ford had settled Sept. 17 (see AI Oct. 1, p. 36).

The settlements at Chrysler and GM were identical to the earlier Ford agreement in basic economic terms. Briefly stated, the wage package includes continuation of the annual improvement factor of 2.5 per cent or 6 cents an hour, whichever is greater, plus the cost-of-living adjustment which now amounts to 3 cents an hour. Skilled workers receive an additional 8 cents an hour.

Chrysler had special provisions written into its contract to cover the number of union representatives in a plant, job transfer and grievance procedures.

The union won a key point from GM on wage inequities at six GM plants where workers doing the same job were paid at different wage rates.

An important provision in all three contracts is a clause which permits management to retire a worker at age 60 by paying double pension benefits, instead of waiting until the 65-year retirement age as in the past.

Other industries where this early retirement prerogative has been in



### NEW ALUMINUM BRIDGE DEMONSTRATED AT LEHIGH

New type aluminum bridge shown here was demonstrated recently on the Lehigh University campus, at Bethlehem, Pa. (see AI, Sept. 15, p. 93). During tests, more than 1 million cycles of force were applied and static loads of up to 175 per cent of the load limit were placed on the structure. Field assembly of the bridge is accomplished by placing the bearing plates on the abutments and bolting the three beams and two bottom plates together with about 200 Townsend lockbolts. Bridge was designed and built by Fairchild Engine and Airplane Corp.



### GAS TURBINE ENGINE

Here is a partial view of an experimental gas turbine engine that has been undergoing exhaustive tests at Ford Motor Co. for the past 18 months. Large "can" with bellows (left) is the combustion chamber. Hot gases travel down to two turbines—one driving the compressor (not shown), the other supplying power to the Ford tilt cab truck driveshaft—then return up the large duct (center) to the heat exchanger.

effect have found it a boon to productive efficiency by eliminating high seniority deadwood.

### S-P 'Lark' in Production, Will Go on Sale Nov. 14

Studebaker-Packard Corp. began production last month on its new entry in the "smaller" car field, the Lark by Studebaker. The new car is slated to go on sale in S-P dealerships Nov. 14.

First Larks were built in South Bend Sept. 29, and the press viewed the car for the first time the following week. The Lark, built on a wheelbase of 108.5 in., will be priced under \$2000, according to S-P president Harold E. Churchill.

The Lark represents Studebaker-Packard's all-out effort to remain in the automobile manufacturing business. All other models except a Silver Hawk sports car are being discontinued in 1959.

### Ren Plastics Opens Seminars On Epoxy Resin For Tooling

Ren Plastics, Inc., has launched a year-long program of seminars on the use of epoxy resin for tooling.

First of the sessions was held Sept. 30 in Lansing, Mich., Ren's home city. Others will follow in Chicago, New York, Dallas, Milwaukee, Philadelphia, Cleveland, Boston, St. Louis, Buffalo, Pittsburgh and Cincinnati.

Later seminars in western cities will be scheduled for later in 1959.

# AI TABLOID AI

Wall Colmonoy Corp.'s research laboratories have developed a new method of making mild sheet steel and other low-cost metals resistant to oxidation, abrasion, and corrosion. A special metal alloy, called Nicrocoat, is applied to the fabricated base metal in a super-thin coating and bonded to it by heating in a pure dry hydrogen atmosphere furnace.

Atomic energy is now being used in the laboratory to vulcanize most rubber materials, but the high cost of radiation prevents its use in commercial applications. Advantages of radiation vulcanization: tires and other rubber products can be "cold" processed much faster than by chemical methods; curing agents are eliminated; and materials can be vulcanized which are difficult or impossible to cure chemically.

American Society of Tool Engineers issued a 61-page report covering the second phase of its research study on the potential use of boride composites for metal cutting tools. Copies of the report titled "Cemented Boride Composites for Tool Bits" can be obtained by sending 50 cents (\$1.00 for non-members) to Leslie S. Fletcher, ASTE Research Fund Director, 10700 Puritan Ave., Detroit 38, Mich.

American Smelting and Refining Co. is turning out small quantities of zinc foil in 0.005 to 0.001 in. sheets, 26 in. wide, by a new process that deposits the metal electrolytically onto a revolving drum. Asarco claims that the new foil is less expensive than copper and aluminum foils and is easy to solder and print.

General Electric Co. reports that its chemists have developed base stocks for hydraulic fluids and lubricants for an atomic-powered plane that can withstand higher temperatures and more radiation than any fluid stock in use today. The new fluids, called metapolyphenyl ethers, were discovered in the company's General Engineering Laboratory under an Atomic Energy Commission and Air Force contract.

Bell Telephone Laboratories scientists report they have produced precision printed circuits—including resistors, capacitors, and leads—by a century-old technique in which ionized gas molecules bombard a cathode, dislodging atoms of metal which then redeposit on nearby surfaces. Using this technique, called cathode metal sputtering, high-temperature metals, such as tantalum and titanium, can be laid down in films of practically any desired shape and size, ranging in width down to a few mils and between a few hundred and a few thousand angstroms thick.

B. F. Goodrich Co. has installed electronically controlled tire curing equipment at its Los Angeles plant that it claims will increase tire production capacity by about 15 per cent. The new curing presses provide better control of the tire curing cycle and make the operators' work easier, Goodrich says.

Propellex Chemical Corp. claims it has developed a new cartridge-actuated device that eliminates aircraft landing-gear failure when something goes wrong with hydraulic or pneumatic systems. A propellant unit unlocks the landing gear by energizing an emergency unlocking actuator, seals off the normal power system, and allows the landing gear to fall free into position.

R-N Corp. announced that its new method of reducing iron ore without the use of costly blast furnaces is now ready for commercial developments. The new process, which might drastically change the economics of steelmaking, involves direct reduction of iron from ore in a rotary kiln where temperatures are kept below the melting point of iron. R-N was formed by Republic Steel Corp. and National Lead Co. to carry out experiments in the process at a pilot plant near Birmingham, Ala.

American Society of Tool Engineers has announced a new American standard covering classification, designation, definition and shank dimension tolerances of diamond tools used for grinding wheels.

# AVIATION MANUFACTURING



*French jet helicopter demonstrates its maneuverability.*

## **French Jet Helicopter Driven By Jet Air From Blade Tips**

The Djinn, a small two-place French-designed jet helicopter, demonstrated its maneuverability in a series of flights at the Washington-Virginia Airport last month.

The Djinn, which is now in production for the French Army, is unique in that its two-blade rotor is propelled by jets of air thrust from the blade tips, after being compressed by a gas turbine engine. The rotor works on the same principle as a rotary lawn sprinkler, using air instead of water.

Dennis Prost, French test pilot, demonstrated to a group of military and government observers how the Djinn can hide behind a tree, hill or building, pop up to launch a missile, and then climb vertically at the rate of 6000 ft a minute.

He also demonstrated a "dead-stick take-off" by shutting off the turbine after the rotor had reached maximum rpm, then taking off, moving forward, and landing—using only the inertia of the rotor. This capability would be a decided advantage in case of power failure at low altitude.

Other features of the plane are its ability to move from a hovering position to forward flight without loss of altitude and its mobility—it can be transported by truck or trailer without dismantling.

The Djinn, which was designed and built by Sud Aviation, producers of

the Alouette II jet helicopter, is 17½ ft long, 8 ft high, and has a range of 140 miles. It is powered by a Turbomecca Palouste IV engine.

Republic Aviation Corp., which sponsored the demonstration, said it is negotiating a licensing agreement with Sud Aviation for the Djinn similar to the one the two companies have on the Alouette. The Djinn, Republic pointed out, has been certified by the CAA for U. S. commercial operation.

## **Thor Seen as Primary Weapon In Defense Dept. IRBM Program**

The Defense Dept. recently stated in reply to a newspaper story that

production is continuing on both the Thor and Jupiter missiles.

But Defense Secretary McElroy is expected to reveal his decision before the end of the year on which land-based IRBM will be built. According to authoritative sources, his decision will be to order full production of the Air Force Thor.

The choice as to whether the Thor or the Army-developed Jupiter would be produced has been pending for a year. It confronted Charles E. Wilson, when he was Defense Secretary, and it has awaited Mr. McElroy's action since he was sworn in last October.

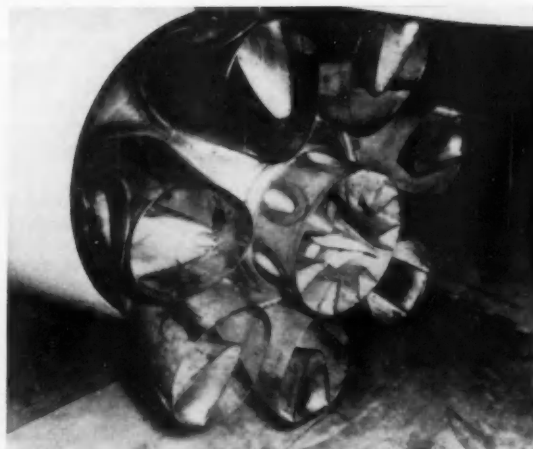
Expected is an order from the defense chief to stop production of the Jupiter at a given point—perhaps not immediately. Thor output will go into high gear. First delivery of the 1500-mile weapon to overseas bases already has been made, and expanded deliveries will follow.

Dropping the Jupiter as a potential weapon may not end its use as a specialized research vehicle. As the Jupiter "C" the missile may be the basic unit in the Army efforts to launch lunar probes.

The Thor-Jupiter debate of the past year came about, almost inevitably, because of the conditions under which the projects were begun. Both the Thor and Jupiter programs were started in 1955, and both were assigned very high priority by the military. But the Jupiter was considered a back-up development, to insure the U. S. of a midrange weapon in case the Thor turned out to be a dud.

## **NOISE SUPPRESSORS**

*Latest version of Rolls-Royce noise suppressors consists of six nozzles—disposed around a central one—that incorporate fluted air inlets to break up and disperse the exhaust. Unit is shown fitted to Pratt & Whitney engine of the first Douglas DC-8 airliner.*





Its experience with the Atlas ICBM gave the Air Force some important tools to use on Thor. Some of the same components and sub-systems are incorporated in both missiles.

The Army and Navy, initially working jointly, got busy on the Jupiter. Both the Thor and Jupiter projects were well into the development stages when the Navy decided to drop out of the Jupiter program. Requirements for a shipboard-launched missile could best be met by a solid-propellant missile, rather than the liquid-fueled Jupiter, the Navy said. The Navy then put in motion its Polaris project, now counted on heavily in strategic defense planning.

By 1957, the Thor and Jupiter were scheduled for full-scale flight tests. Errors of various types prevented successful flights of the first two Thors and Jupiters. The third Thor blew up on the test stand. But the third Jupiter made a fully successful flight.

The Army apparently gained the edge over the Air Force in IRBM development. From the Defense Dept. level, though, the Thor was still seen as the primary midrange weapon. Production commitments had been made, with Douglas Aircraft Co. as the producer. If the Thor reliability could be assured, the missile would be ready for output.

Mr. McElroy believed it would be possible to achieve reliability of both Thor and Jupiter by this fall. He now is confident that the Thor is a dependable and usable weapon. His decision, therefore, is to have the primary IRBM produced in quantity.

#### Chrysler Corp. Gets Extension On Redstone Missile Contract

Chrysler Corp. has been granted a \$27 million contract extension for production of the Redstone missile and components at the company's Michigan missiles plant.

The company currently is building



#### TRANSLAND Ag-2 FEATURES 2000-3000 LB PAYLOAD

*Transland Ag-2, built by Transland Div. of Hi-Sear Rivet Tool Co., is designed for agricultural and forestry service throughout the world. The all-metal, low-wing monoplane is powered by a 600-hp R-1340 engine and can carry a payload of 2000 lb of low-density solids and up to 3000 lb of higher specific gravity materials. The Ag-2 is expected to be available in several versions—two place, single place, open cockpit and closed cockpit.*

both Redstone and Jupiter missiles, although the fate of the Jupiter currently is being decided in Washington.

Chrysler received the original production contracts for both Redstone and Jupiter. New money has been added to both contracts at various times for continuation of production. Chrysler's total-missiles contracts now amount to more than \$330 million.

#### Goodyear Is Developing New Airplane-Helicopter Concept

Goodyear Aircraft Corp. announced it is working on a new aircraft concept for the Army known as Convolplane. The new vehicle will combine the best flight features of an airplane and helicopter.

Goodyear engineers explained that the new aircraft will be designed to make the transition from forward flight to hovering, without rotating the plane or the power rotor axis, and without using auxiliary propulsion.

Goodyear is making the study under a contract with the Army Trans-

portation Research and Engineering Command.

The Convolplane will make the transition from forward to vertical flight simply by changing the direction of air flow. It will be equipped with two large rotors housed in the combined wing-fuselage area.

In forward flight, Goodyear engineers said, air would enter at the wing's leading edge, be directed through the rotor blades, and exit at the trailing edge. Small vanes would be used to change the direction of air flow.

In vertical flight, louvers or slats, like those in a venetian blind, would open, allowing the air to flow vertically as in a helicopter.

#### Aircraft Spending Cut \$30 Million for 1959

The Defense Dept. will spend about \$30 million less for aircraft and missiles in fiscal 1959 compared with the previous year, in spite of an estimated \$2 billion increase in defense expenditures.

Figures released by the Defense Dept. show that total expenditures in fiscal 1959 will be about \$40.9 billion compared with \$39 billion in fiscal 1958. Aircraft and missiles will account for \$10.9 billion, compared with \$11.2 billion in the previous year.

The same pattern is shown for fiscal 1959, with new orders for aircraft and missiles estimated at \$11.7 billion for fiscal 1959, compared with \$12.3 billion the previous year; and total obligations in 1959 of about \$45 billion compared with \$43 billion in fiscal 1958.

Biggest share of the overall in-

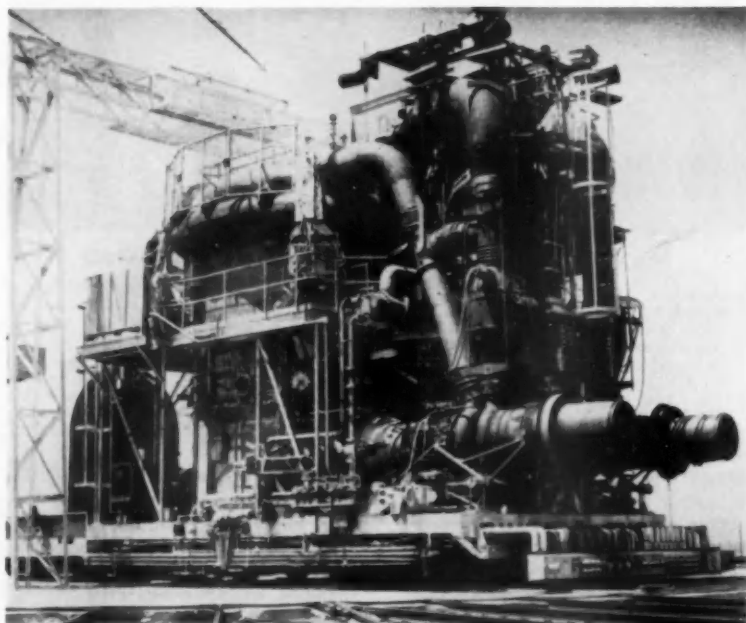


#### CONVAIR JETS

*Five aft fuselage sections for Convair 880 jet airliners fill assembly fixtures at Convair Div. of General Dynamics Corp. A sixth section (in foreground) has been removed in preparation for mating of wing and fuselage. Production schedule calls for six of these transports a month by June, 1960.*



# AVIATION MANUFACTURING



## NUCLEAR REACTOR POWERS MODIFIED TURBOJET

*This photograph shows nuclear reactor used to power two General Electric modified J-47 engines in what is believed to be the first successful experiment of its kind in ground operation of aircraft jet engines. The large tank contains an air-cooled, water-moderated reactor. Air is compressed in the two J-47 engines at right and piped to the reactor. The heated air turns turbine rotors and is exhausted through engine nozzles. Conventional jet fuels start engines; but after initial startup, heated air from the reactor is added until enough is available to allow conventional fuel to be shut off. Test was conducted by GE's Aircraft Nuclear Propulsion Dept.*

crease in both obligations and spending will go to research and development programs. R&D obligations will rise nearly \$1 billion from \$1.89 billion in fiscal 1958 to \$2.81 billion this year. Spending shows a similar rise from \$1.7 billion in 1958 to \$2.4 billion in fiscal 1959.

## Aircraft Industry Ups Use Of Titanium Alloy Fasteners

The aircraft industry is using about 20 million titanium alloy fasteners a year, compared with about 1 million in 1955, according to the Air Material Command.

The big jump came about as a result of a study made by Northrop Aircraft, Inc., under a contract awarded the firm by AMC's Manufacturing Methods Branch.

AMC said the study showed that use of titanium alloy in screws, bolts and rivets brought about a 35 per

cent reduction in fastener weight per aircraft. Other advantages listed were better heat and corrosion resistance, and better strength-to-weight ratio over steel fasteners.

The study also revealed better methods of manufacturing titanium fasteners, which should further increase use of titanium alloys, AMC said.

## JIG BORER

*Automated jig borer can make nearly 100 slots (contour and dovetail) in two operations on compressor disks for General Electric's T58 turbine engines. Previously, slots were made with manually controlled milling machine. Unit was built to GE specifications by De Vlieg Machine Co.*



## Tenney Engineering Builds Huge Environmental Test Unit

A new \$500,000 environmental test chamber, believed to be the biggest of its kind, has been built by Tenney Engineering, Inc., for McDonnell Aircraft Corp.

The unit is 18 ft high, 18 ft across, and 42 ft deep. It has a temperature range of minus 100 to plus 1200 F, with an ultimate altitude of 125,000 to 150,000 ft.

Tenney engineers said the new chamber can simulate air flows up to 100 psi at 75,000 ft and at various temperature conditions. It can dissipate a live heat load equivalent to 30 hp at altitude conditions.

## Merger of Thompson Products And Ramo-Wooldridge Is Set

Thompson Products, Inc., and Ramo-Wooldridge Corporation will merge Oct. 31 to form Thompson Ramo-Wooldridge, Inc.

Stockholders of both firms approved the merger Sept. 30. Thompson Products owns approximately 57.5 per cent of the Ramo-Wooldridge common stock.

The new firm will have assets of more than \$200 million and combined sales for 1958 of between \$300 million and \$325 million. Employment will total more than 20,000.

Thompson Ramo-Wooldridge board chairman and chief executive officer will be J. D. Wright, now president of Thompson Products. Dr. D. E. Wooldridge, now president and director of Ramo-Wooldridge, will become president of the new firm.

A report that the company may go out of the automotive production field was dismissed as ridiculous by TP operations vice-president Horace Shepard, who will be assistant to the TRW board chairman.

"As a matter of fact," Mr. Shepard said, "we plan to spend just as much time and thought, money in the automotive field as ever."

# MEET

## IN THE NEWS



*B. F. Goodrich Industrial Products Co.—James C. Richards, Jr. was named vice-president, sales.*

**B. F. Goodrich Co.**—**John L. Collyer**, chairman of the board, has relinquished the position of chief executive officer and he is succeeded in this post by **J. Ward Keener**.

**Borg-Warner Corp.**, **Pesco Products Div.**—**Joseph A. Wilson** was named manager of a new branch in New York City.

**Controls Co. of America**—**Donald M. Strathearn** has been appointed director of sales for appliance and automotive controls.

**Bendix Aviation Corp.**—**Harry H. Goode** was named technical director of the Systems Div., and **Marvin E. Waspe** was promoted to plant manager of the Cincinnati Div.

**Dana Corp.**—**Wilson T. Groves** has been appointed chief metallurgical engineer.

**Clearing Machine Corp.**, **Machine Tool Div.**—**Paul N. Stanton** has become manager.

**Yale & Towne Mfg. Co.**, **Materials Handling Div.**—**Thomas N. Parlon** was made sales manager for Yale electric lift trucks.

**Electric Auto-Lite Co.**—**C. R. Zink** was named general sales manager of automotive original equipment for the Electrical Products Group.

**Hughes Aircraft Co.**—**Ralph B. Reade** was named manager of the communications division of the Airborne Systems Group.

**Graham Tool Co.**—**John T. Bennett** was appointed sales manager.



*Oakite Products, Inc.—Eustace Lingle has been appointed vice-president in charge of industrial sales.*



*Puralator Products, Inc.—H. C. Mouwen was named manager of Research and Development Dept., and Jules Kovacs has been made vice-president in charge of technical sales.*

**Acme Steel Co.**—**G. Findley Griffiths** was named executive vice-president, commercial, and **Joseph H. Myers**, vice-president, marketing.

**Clark Equipment Co.**, **Brown Trailer Div.**—**Henry G. Milans, Jr.** was appointed eastern region sales manager.

**Reynolds Metals Co.**—**William R. Comber** was made manager of the Grand Rapids, Mich., aluminum extrusion plant.

**Pheoll Mfg. Co.**—**Frank Mears** has been made consumer sales manager of the Industrial Fastener Div.

**Borg-Warner Corp.**, **Marbon Chemical Div.**—**D. M. Pratt** was appointed sales manager for resins and adhesives and **William A. Suiter** sales manager for Cyclocac plastics.

**Houdaille Industries, Inc.**, **Buffalo Hydraulics Div.**—**E. L. Spencer** has become general sales manager.

**Victor Mfg. & Gasket Co.**—**Harvey B. Mims** has retired as eastern district sales manager and he is succeeded by **Clyde C. Hill**.

**Simmonds Aerocessories, Inc.**—**Harrison F. Edwards** was named technical operations manager and **Harlan C. Pringle** field operations manager of the Contracts and Service Div.

**Dow Chemical Co.**—**Dr. William H. Schuette** was elected a company vice-president.



*Oliver Corp.—Carl L. Hecker was elected president, succeeding Alva W. Phelps, who retains his position as chairman of the board and chief executive officer.*



**General Motors Corp.**, **Moraine Products Div.**—**Mark E. Rasper** has been appointed sales manager of automotive assemblies.

**Westinghouse Electric Corp.**—**V. V. Schlosser** was made manager of engineering of the atomic equipment department, Cheswick, Pa.

**Pangborn Corp.**—**Jack K. Schultz** was named Philadelphia district manager.

**Oakite Products, Inc.**—**George M. Seib** was appointed vice-president and **Erwin H. Steif** succeeds him as company secretary.

**American Chain & Cable Co., Inc.**—**Joseph N. Kemple** has been promoted to general manager, Page Steel & Wire Div.

### Necrology

**Stewart J. Cort**, 77, retired vice-president in charge of the steel division of Bethlehem Steel Co., died Sept. 23, at Bethlehem, Pa.

**John Rush**, 49, assistant manager of manufacturing services in the Aircraft Div. of Bell Aircraft Corp., died Sept. 22.

**Charles J. Pankow**, 72, retired treasurer and chief engineer of Crosby Co., Buffalo, N. Y., died Sept. 21.

**O. S. McGuffey**, 62, former chief engineer at Tranter Mfg., Inc., died Sept. 11, at Lansing Mich.

**Raymond P. Kells**, 58, chief service engineer for Latrobe Steel Co., died recently, at Pittsburgh, Pa.



*Fellows Gear Shaper Co.—Russell M. Fellows was elected chairman of the board.*



## YALE outperforms any loader—handles 25% more material every hour...Field tests prove it!

**EXTRA WORK PER HOUR.** No matter what bulk you handle, you'll get more productive work at less cost with the new Yale Industrial Tractor Shovel. It carries more—full 2500-lb. bucket capacity. It moves faster—accelerates to operating speed of 8 mph in 3.5 seconds—to 13 mph in 5.5 seconds. Exclusive Yale Torque Transmission (fully automatic) permits quicker, smoother starting, eliminates shifting, provides more power under load conditions—speeds cycle operations. Gasoline or LP-Gas.

**EXTRA SAFETY.** Yale's exclusive Safety-Curve Arms assure extra-safe elbow room—extra visibility when bucket is raised.

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For a demonstration in your plant or for actual case histories, write to The Yale & Towne Manufacturing Co., Philadelphia, Pa., Dept. A-710.

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- Exclusive sealed brakes
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- Exclusive 6' dumping clearance

\*Based on comparative initial costs depreciated over 10,000 working hours.

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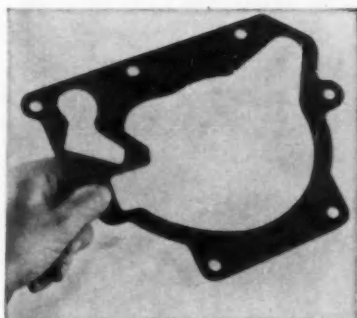
# Technical data for gasket design and selection

NUMBER SIX

## New asbestos gasket will not crush or extrude under heat and pressure

The combined effects of high flange loads and ambient temperatures in the 300° F. range impose severe demands on gasket materials.

In some applications—as, for example, in modern automotive transmissions—these operating conditions can cause extrusion and crushing of conventional gasket materials.



Effective sealing under such conditions requires a dense material with unusual resistance to crushing at high temperatures. A material that meets these requirements is Accopac AN-890, a new Armstrong asbestos gasket.

Under test loads of 100,000 psi at temperatures of 350° F., AN-890 shows no noticeable extrusion or crushing. Indications are that the excellent torque retention properties of AN-890 would not be impaired even at much higher temperatures.

AN-890 is made by a beater-saturation process pioneered and patented by Armstrong. This method coats the fibers uniformly with a nitrile-type latex rubber binder and links them so tightly that crushing and extrusion are eliminated in normal applications.

With all its advantages, AN-890 costs less than conventional compressed asbestos materials. For more information, send for a copy of bulletin IND-915.

## How internal pressure affects the selection of resilient gasket materials

Resilient gasket materials are most widely used where internal pressures are relatively low (e.g., up to 100 psi).

Because of pressure surges or intentional design, resilient materials sometimes are operated at internal pressures considerably above 100 psi. In such cases, the possible effect of the higher pressures should be taken into account.

Internal pressure acts against the gasket in two ways:

1. **Hydrostatic end force.** This tends to move the flanges apart and is proportional to the internal pressure. The extent to which this happens, of course, determines how much the load on the gasket is reduced, and how much the risk of leakage is increased.

2. **Blowout pressure.** The sealed fluid or gas exerts direct pressure on the inside perimeter of the gasket. If this pressure is high enough, it will blow the gasket out of the joint.

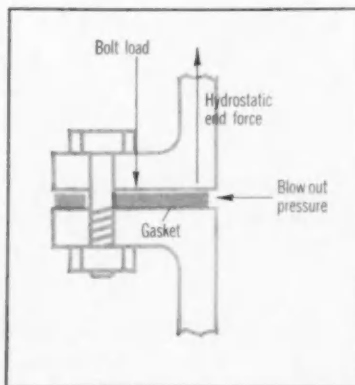
The effect of high internal forces must be compensated for in the design of the joint. The obvious first step is to be sure that the flanges are capable of imposing the required unit load on the gasket. This involves the rigidity of the flanges and the number of bolts, their size, spacing, and torque values.

The second step is evaluation of the gasket material to be used. High unit loads dictate the choice of a material that will not extrude or rupture under high pressures. This usually means a dense fiber or asbestos material. Several compositions suitable for service under high flange loads are available in the Armstrong Accopac line of beater-saturated gasket materials.

Other factors such as the nature of the contained fluid and the tempera-

ture at the gasket line also have a bearing on the selection of a gasket material for service where internal pressures are high.

In summary, where internal pressures are involved, it is especially de-



sirable to consider the joint as a unit. The flange design, the gasket material, the confined fluid, and the temperature should be considered in relation to each other.

Detailed information on the effect of internal pressures and other problems of gasket selection, design, and performance are included in the new Armstrong Gasket Design Manual. Write today for your copy of this helpful 32-page book.

Send today for your copy of new Gasket Design Manual, IND-763. Write Armstrong Cork Company, Industrial Division, 7110 Imperial Avenue, Lancaster, Pa.



## Armstrong GASKET MATERIALS

... used wherever performance counts



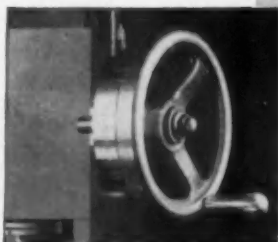
# FOOTBURT

## Accurate grinding for small parts

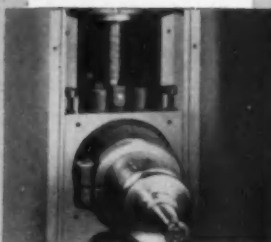
The Hammond No. 2, 6" x 18", Surface Grinder is a precision tool room machine for use on the most accurate gauge and tool work. The standard spindle is direct motor driven and is mounted on precision preloaded ball bearing. Total vertical adjustment is 10 $\frac{3}{4}$ ". In and out movement of table is 6 $\frac{1}{2}$ " with a longitudinal travel of 18".

**THE FOOTE-BURT COMPANY • Cleveland 8, Ohio**

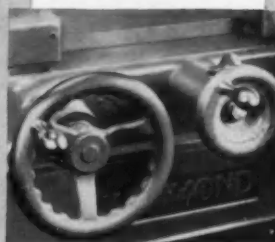
Detroit Office: 24632 Northwestern Highway, Detroit 35, Mich.



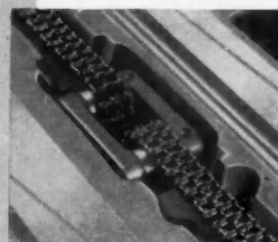
**Accurate Spindle Adjustment**—Standard vertical adjustment of spindle through handwheel is .0005". With Vernier attachment, spindle can be raised accurately to .00005".



**Solidly Supported Spindle Carrier**—Spindle carrier is moved vertically on double dovetail ways with adjustable tapered gibbs.



**Convenient Hand Control**—Handy wheels for cross travel, accurately gauged to thousandths, and quick acting longitudinal travel.

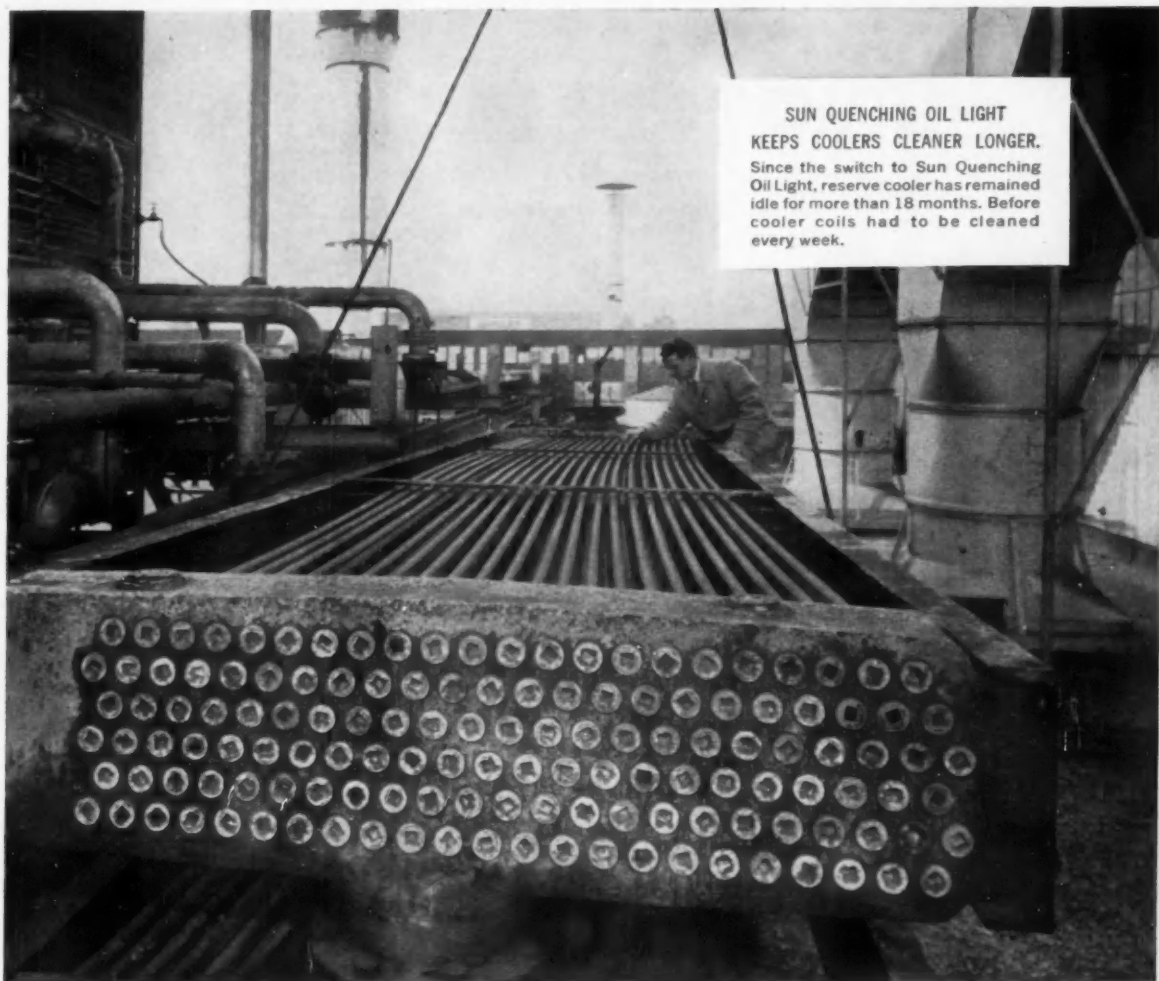


**Smooth Roller Chain Table Drive**—Remarkably smooth finish on work, without chatter marks frequently found when table is moved by conventional means through rack and pinion.

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## CLECO 10 SERIES DRILLS AND SCREWDRIVERS

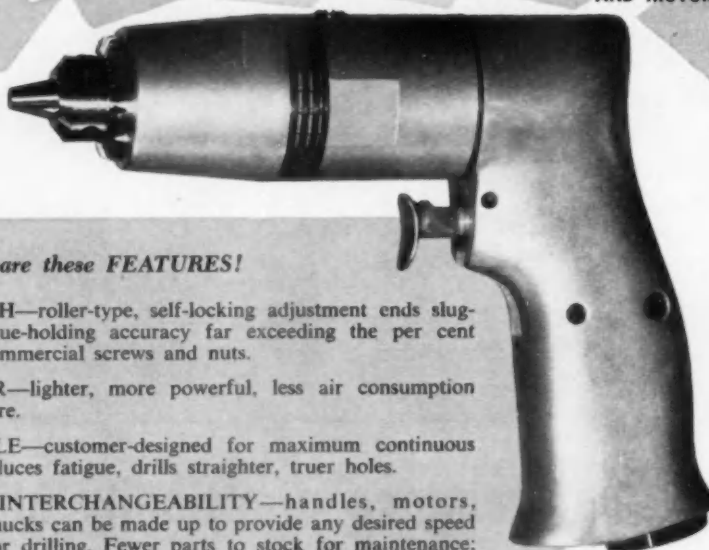
*feature unusual interchangeability,  
unequaled torque-holding ability*



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The new CLECO 10 Series Drills and Screwdriver-Nutrunners offer modern, functional design both inside and out. They are lighter, more powerful and cost less to run than ever before; yet they are actually simpler and are built for

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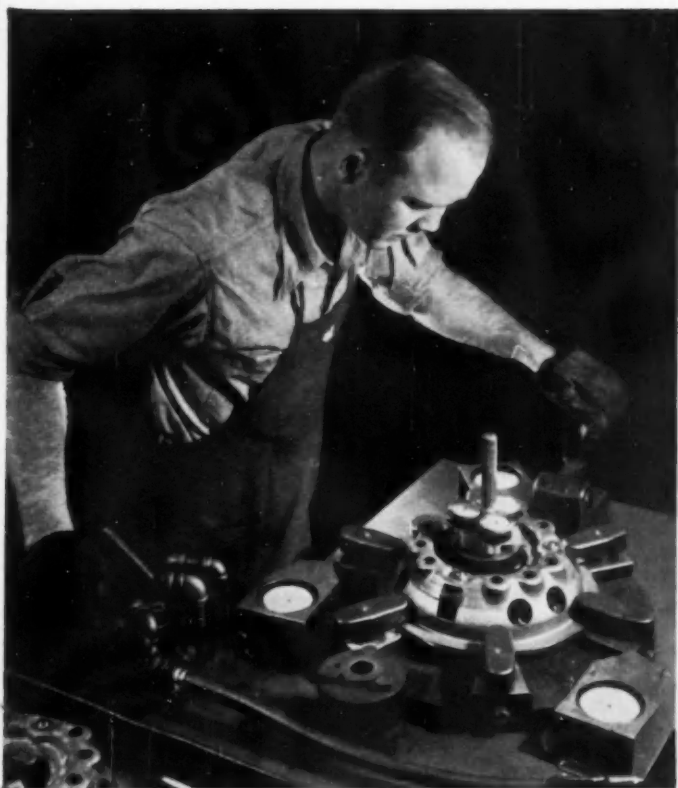
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In the photograph at the left, for example, release levers are being checked on special equipment to make sure they are parallel with the pressure plate. As shown at the right, every Borg & Beck clutch plate is carefully tested for correct deflection to assure positive release. And every driven plate and cover assembly is dynamically balanced for maximum smoothness of operation.

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Pontiac Bonneville Vista four-door hardtop sedan features wrap-around rear window

## Pontiacs for 1959 All-New

**B**REAKING with traditional styling, Pontiac has launched its 1959 line with entirely new bodies mounted on a redesigned frame. Among the highlights of the new chassis is an increase of almost five inches in the tread, to 63.72 in. front, 64 in. rear.

The displacement of Pontiac's V-8 engine has been increased to 389-cu in. It has a bore of 4-1/16 in., stroke of 3-3/4 in. The engine will be offered in three compression ratios—8.6 to 1, 10 to 1, and 10.5 to 1; and with a choice of 2-bbl, 4-bbl, and three, 2-bbl carburetor combinations, to provide

a range of horsepower from 215-bhp to 345-bhp.

Pontiac stresses fuel economy for those who want it. To this end it offers the V-8 with 8.6 to 1 compression ratio with a 2-bbl carburetor, in combination with an axle ratio of 2.87 to 1. Car buyers who want economy combined with fleet performance can specify this engine in combination with Hydra-Matic drive.

Three series with 14 models are offered in 1959. The top series is the Bonneville mounted on a 124-in. wheelbase chassis. The Safari station wagon is on a 122-in. wheelbase. The Star Chief

features three models on a 124-in. wheelbase, and a new Catalina series, mounted on 122-in. wheelbase, offers nine models.

The 1959 V-8 has the same bore—4-1/16 in.—as the 1958 engine, but has a new shell-molded cast crankshaft of pearlitic malleable providing a stroke of 3-3/4 in. The economy version of this engine, with 8.6 to 1 compression ratio, has a specially designed carburetor, intake manifold and camshaft. It runs on regular fuel. Crankshaft main bearing journals, which have been increased to three-inch diameter, employ steel-backed Durex bearings with a babbit overlay.

Improvements have been effected in the clutch, pistons, exhaust system, and the 4-bbl carburetor, standard on all Bonneville models.

The tubular center X-frame has been completely redesigned for greater strength and rigidity. The ride has been improved by suspending the lower control arm in rubber; by increasing the angularity of front control arms with respect to each other to give greater anti-dive effect; by the use of larger front coil springs having lower spring rates; and by modifications in shock absorber valving to provide a softer ride.

Air ride suspension is available in all models, substantially

### 1959 PONTIAC ENGINE AND TRANSMISSION COMBINATIONS

Car Models or Special Engine Description	Std. or Opt.	Transmission*	Compression Ratio	Induction System	Max. BHP	Max. Torque
Catalina and Star Chief	Std.	SM	8.6	2 bbl	245 @ 4200	392 @ 2000
Bonneville	Std.	SM	8.6	4 bbl	260 @ 4200	400 @ 2000
Catalina and Star Chief	Opt.	HM	10.0	2 bbl	280 @ 4400	408 @ 2000
Bonneville, Catalina and Star Chief	Opt.	HM	10.0	4 bbl	300 @ 4600	420 @ 2000
Triple Carb.—All Models	Opt.	SM or HM	10.5	3, 2-bbl	315 @ 4800	425 @ 3200
Police Car Special	Opt.	SM or HM	10.0	4 bbl	300 @ 4000	420 @ 2800
Tempest 420-A (4 bbl)—All Models	Opt.	SM or HM	10.5	4 bbl	330 @ 4800	420 @ 2800
Tempest 420-A (3, 2-bbl)—All Models	Opt.	SM or HM	10.5	3, 2-bbl	345 @ 4800	425 @ 3200
Tempest 420-E—All Models	Opt.	HM	8.6	2 bbl	215 @ 3800	380 @ 2000

\* Synchronesh, or Hydra-Matic.

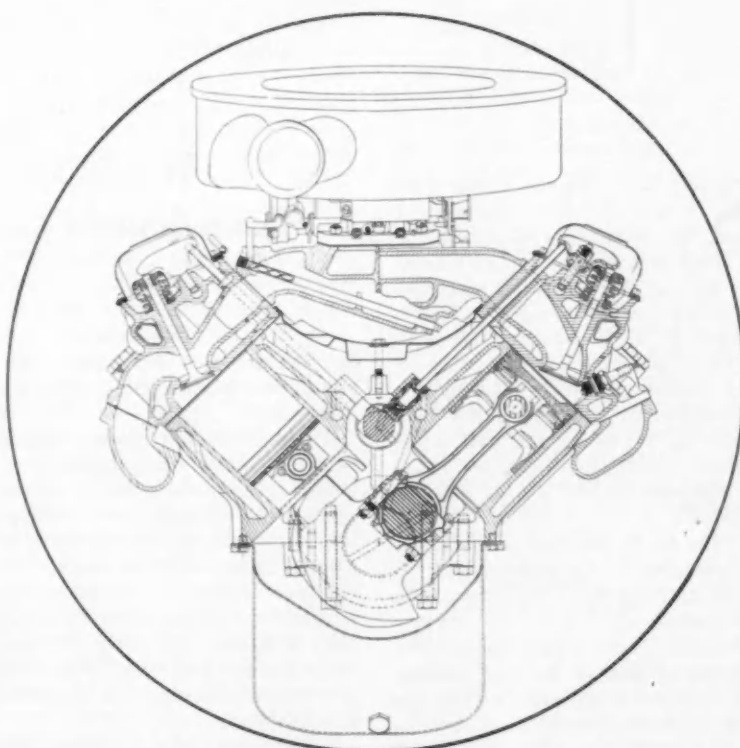


**Star Chief four-door sedan has a wheelbase of 124 in.**

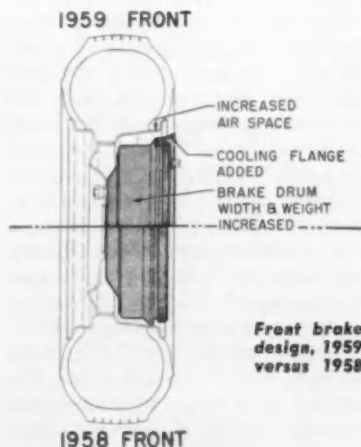
unchanged. The non-slip differential also is offered as extra cost equipment.

Hydra-Matic transmission, available in all models, has been modified to provide even smoother shifts, increased reverse capacity, and greater durability. These improvements have been effected by means of a new rear clutch plate material; and a new reverse clutch with both internal and external contact surfaces on the cone.

The new rotary valve, inline power steering gear is offered this year. Its chief features include compactness and reduced steer-



**Transverse section of the Pontiac 389 cu in. V-8 engine**



**Front brake design, 1959 versus 1958**

ing effort, while adding to the feel of the road.

Brakes have been improved by adding about 10 per cent more lining area, and 39 per cent more drum weight. Both front and rear brake drum widths have been in-

creased; cooling flanges have been added to the front drums; and there is additional air space between the wheel rims and brake drums.

Optional power brakes also in-  
(Turn to page 101, please)

# Why Plastics Have Not Made Greater Headway for Automotive Uses

**Panel Discussion  
on That Subject Featured  
at Detroit Section Meeting,  
Society of Plastics Engineers**

**By  
Joseph Geschelin**

SOME time ago one of the passenger car producers studied the possible applications of plastics on a motor car and turned up with an estimate of at least 100 pounds per car. Although Chrysler's Garwood, SPE banquet speaker, later in the program said that he did not foresee wide use for plastic structures in autobodies, the fact remains that motor cars have a potential of much more than the 18-20 lb average current use of plastics per car.

Why is it then that plastics are not employed to a greater degree? This question was answered quite adequately by a panel of automotive experts at the 4th Annual Conference of Detroit Section, Society of Plastics Engineers, at the St. Clair Inn in September.

The consensus was that many suppliers of basic raw materials as well as the fabricators have not done an adequate job of promoting plastics and educating users in their applications. The panel agreed that the designer is at the hub of the problem. Unless he is reached by advertising and other promotion, as well as by competent applications engineers, only small progress can be made. For the fact is that un-

less the designer tailors parts specifically for plastics the application will fail.

The point is that where a plastic replaces some other material—a stamping or a die casting, for example—the designer must redesign the part to suit the requirements of plastic materials. He cannot use the same drawings or the same configuration and expect the plastic part to function properly. Formations and sections must conform to the special requirements of plastic formulations.

Purchasing agents claim that many plastic vendors do not provide adequate information as to the special advantages and limitations of their materials. Buyers want to cooperate; they want the story to reach the proper people. But they are hampered by the lack of solid technical data. They feel that vendors must do a better job of advertising and providing literature in order to educate all concerned.

## **Technical Information Needed**

Another problem is the lack of standardization of formulations; a lack of information as to physical and chemical properties. The panel also called for more information on life tests, car service tests, and identifying specification numbers certified by standardizing bodies such as SPI, ASTM, SAE.

Selling to the automotive industries is a complex problem due to the interlocking of interests of various departments. Complexity varies with the size of the organization. But generally, it is important to reach not only purchasing but the engineering design department, materials engineers, chemical and metallurgical department, research center, and the manufacturing department. In the case of plastics, in particular, it is also necessary to make the sale to the stylists as well as the sales department since so many applications are in the area of consumer eye appeal.

The background for this summary may be judged by the composition of the panel. William Gobeille, manager plastic division, American Motors Corp., was the moderator. Members of the panel included: Judd Forrester, research division, Ford Motor Co.; C. James Rawson, organic materials laboratory, Chrysler Corp.; R. C. Waters, non-metallic materials, GMC Truck & Coach Div.; L. E. Horodyski, purchasing agent, AC Spark Plug.

An impressive summary of the potential applications of new materials as well as of older but improved plastic formulations was presented by M. F. Garwood, chief engineer, materials engineering division, Chrysler Corp. Prominent

in the list is du Pont's Delrin which he sees as a useful engineering material for instrument clusters, hardware items, molded printed circuits. Urethane foams have great potential for seating molded to shape, for coatings, for safety padding. He pointed to new phenolic pre-mixes for producing large castings; melamines in automobile finishes, in alkyd plastics, and in developing a complete printed circuit to replace wiring harness. Garwood also touched on expanding uses of nylon and teflon; polycarbonates for films and parts; and mentioned many other distinctive formulations both old and new.

One may conclude from Garwood's presentation that the future looks bright for plastics, confirming the estimate mentioned earlier that motor cars should consume much more plastics than are utilized in current vehicle production.

The technical program was replete with papers dealing with various aspects of current applications. A summary of the use of thermoplastic materials in interiors was provided by T. R. Grimes, Royalite Div., U. S. Rubber Co. He centered his presentation around the SPI-recognized ABS-type plastics, referring to acrylonitrile, butadiene, and styrene, respectively—each of which contributes certain of the properties desired in a high-impact, long-lasting thermoplastic sheet which is resistant to most chemicals and can be produced commercially.

### **New Applications**

Grimes gave examples of commercial applications. An ABS-type material has been used extensively for seat side shields, originally metal stamped covered with a coated fabric or painted. Recent improvements include faster forming and trimming cycles, and better compounding of ingredients.

ABS materials have served successfully in the development of center pillar covers for four-door hardtops, replacing costly steel stampings. Other applications include windshield garnish molding, miscellaneous rigid parts, and

molded headliners. Here the application may be a one-piece self-supporting headliner; or a combination of materials to provide a one-piece, self-supporting installation which can be installed quickly.

Another class of ABS materials—modified flexible thermoplastic sheet—is excellent for upholstery application and, according to Grimes, should become popular for seating construction and other adjoining padded areas. Grimes also commented on the use of the modified flexible ABS or Vinyl materials with urethane foam padding for variety of instrument panel trim pads.

In general Grimes painted a bright future for thermoplastic materials as well as plastic foams.

A cautious approach to polyester premixes was made by Owen H. Pulham, Woodall Industries, Inc. He warned that acceptable product applications depend upon experience and skill and research, mentioned failures due to lack of control as well as questionable business ethics. Woodall has produced over 100 different parts including—seat sides, radio housings, arm rest foundations; heater component parts such as—ducts, housings, plenums, blower motor housings, etc.

The growth of usage of plastic lenses in motor vehicles was summarized by August Meyer, Jr., Electric Auto-Lite. Such lenses now are used in parking and turn-signal lamps, tail lamps, stop and turn-signal lamps, back-up lamps, and license lamps. Among the types of lenses made for specific applications are: dioptric prisms refracting light rays only; catoptric prisms—reflecting light rays only, used only where a reflector is included in the optical system; catadioptric prisms—providing both refraction and reflection; reflex reflectors—used primarily in the form of buttons.

### **First Surface Metallizing**

According to William Pahl, Ford Motor Co., his company has used "first surface" vacuum metallizing of plastic interior trim parts for two years and is considered to be a pioneer in this field. "First sur-

face" metallizing has been employed at Ford on main instrument cluster and odometer dials; and clock, heater, and radio instrument panel opening covers. Main instrument cluster and odometer dials were one-piece moldings of acrylic.

These major steps in applying a "first surface" metallized finish to plastic parts were outlined by Pahl:

1. Application of the base coat to provide adhesion and a high gloss surface as a base for the metallic film.

2. Deposition of the metallic film in a vacuum of  $\frac{1}{2}$  micron or less.

3. Application of a clear top coat if the finish is to simulate chromium plate; or a tinted top coat if a transparent metallic color tint is desired.

It is important to note that the coating system must be varied to meet the requirements of specific plastics, particularly with respect to the base coat and top coat. Pahl recommends working with the lacquer suppliers who are familiar with the formulation of coatings for the various types of plastics in the interest of getting the job done properly.

Finally, Pahl remarked that there is a big future for metallized parts, replacing not only interior trim parts which are now chromium-plated or painted but some exterior parts as well. Exterior applications, however, will have to wait for the development of better plastic formulations as well as more durable coatings.

### **Increase in Automation**

A brief review of compression molding advances as well as a system of semi-automatic molding was provided by Bonkowski and Meister, Ford Motor Co. The authors emphasized that a considerable amount of effort and money have been spent at Ford to create economical methods of molding. By reducing the work load of the operator and reducing press-open time to a minimum, it has been possible to increase press output materially. Currently, attention is being given to a still further increase in auto-

*(Turn to page 96, please)*





*Fairlane four-door sedan*

## New Line of Ford Passenger Cars

**Two-Speed Automatic Transmission Offered as Optional Equipment for 1959**

**S**OME distinctive engineering developments plus many sheet metal styling changes combine to create an attractive line of Ford cars for 1959. Styling changes, while not extensive, nevertheless create new appearance values without losing family identification.

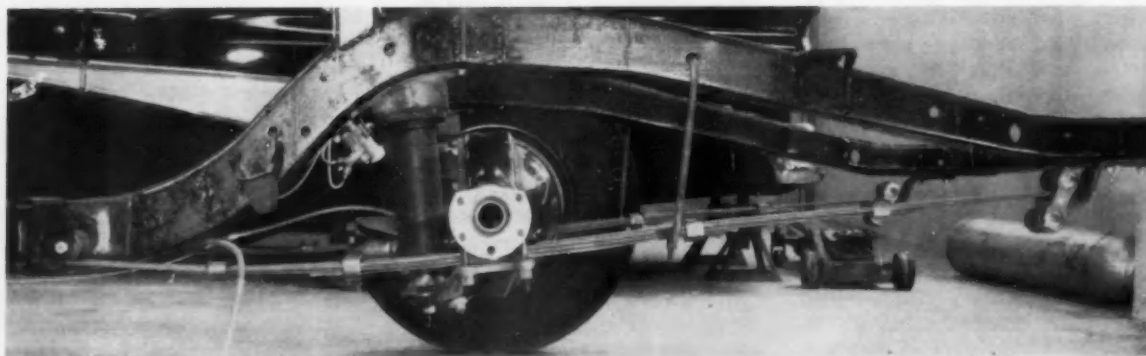
Mounted on a wheelbase of 118 in. the Ford family of cars consists

of the following Series: Custom 300; Fairlane; Fairlane 500; and Station Wagons.

Although engines have been refined in detail, from the standpoint of significant specifications the changes are slight.

Perhaps the most important mechanical change is found in the introduction of an entirely new Ford-O-Matic transmission of two-speed

design, replacing the former Ford-O-Matic. It adds only 18 lb of weight by comparison with a standard synchromesh transmission, has 105 less parts than the former design, is much simpler in construction and easier to service. As a matter of fact, the objective in presenting this drive is to offer the buyer the lowest priced automatic in Ford's history.



*Arrangement of air suspension unit at rear*

## 1959 FORD PASSENGER CAR ENGINES

### Brief Specifications Data (All Overhead Valve Type)

Designation	223-IV	292-2V	332-2V	352-4V
Type & No. Cyl.	I-4	V-8	V-8	V-8
Bore (in.)	3.82	3.75	4.0	4.0
Stroke (in.)	3.6	3.3	3.3	3.5
Displacement (cu in.)	223	292	332	352
Compression Ratio (to 1)	8.4	8.8	8.9	9.0
Bhp (max.)	145 @ 4000 rpm	200 @ 4400 rpm	225 @ 4400 rpm	300 @ 4600 rpm
Torque (lb-ft) max.	206 @ 2200 rpm	285 @ 2200 rpm	325 @ 2200 rpm	380 @ 2800 rpm
Carburetor	Single	2-bbl	2-bbl	4-bbl

The Cruise-O-Matic drive, used last year, is available as optional equipment with the 332-2V and 352-4V engines.

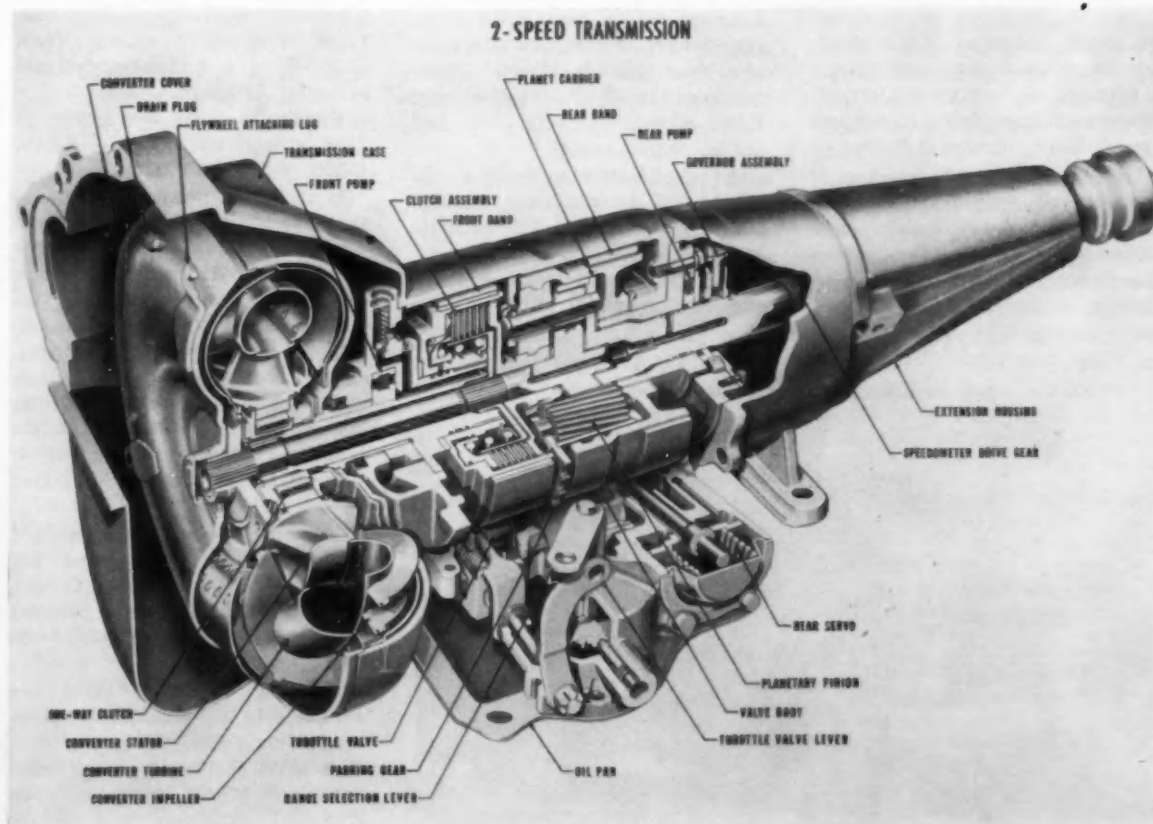
Another development marks a major change in the Ford air ride. This option still retains four air bags, the two at the front functioning as before. At the rear, however, the air bags act in conjunction with leaf springs. The

leaf springs, made of wide spring stock, have only three leaves, and are mounted eccentrically with respect to the center bolt to provide a low frequency, variable rate. By anchoring the short, stiff front section of the spring on a fixed hanger, Ford takes full advantage of Hotchkiss drive. The leaf springs are designed to handle boulevard ride conditions, the rear air bags

coming into play only on rough or bumpy roads, or to pick up extra load. They also serve a leveling function. This change in function of air ride components has simplified the mounting arrangement at the rear; also a single speed leveling system is used, dispensing with the complicated system of mechanism used last year.

All inner muffler shells are fabricated of heavier gage stock, while inner and outer shells as well as end covers are made of zinc-coated sheet to provide for corrosion resistance. Another feature is that the inner shell is wrapped with asbestos to provide for better thermal insulation, also to reduce condensation materially.

Use of aluminum for the one-piece case and bell housing of the new Ford-O-Matic transmission, as  
(Turn to page 95, please)



Two-speed Ford-O-Matic transmission

**F**OR 1959 the Ford truck line offers numerous new features for light, medium, and heavy duty models. It includes four-wheel drive models in the F-100 and F-250 Series (not available for delivery at the time of announcement); a group of new tilt cab tandems; a special tractor package; and a new four-speed auxiliary transmission.

Leaders in the line are the Custom Ranchero and Courier, both mounted on 118-in. wheelbase. The increased wheelbase provides a total load space of 33.4 cu ft for the Ranchero; while in the Courier sedan delivery it provides a loading length of almost 84 in. Both vehicles have been treated to some interesting mechanical features. Link-type stabilizers have been added to the ball-joint front suspension and variable rate, six leaf rear springs have been provided with tip inserts.

The 223-cu in. Ford Six-cylinder engine is standard, while either the 292-or 352-cu in. V-8 is available as optional equipment. There is a choice of four transmissions: three-speed, overdrive, two-speed Ford-O-Matic, Cruise-O-Matic.

Here are some new mechanical features offered in the light, medium, and heavy duty models. All models 500 and up have a two-shoe; internal expanding type parking brake as standard equip-

ment, located on the rear of the transmission. Frame reinforcements extended through the rear hanger of the rear spring have been added on the two short wheelbase models of the F-and C-750, 800, and 850 series.

New tilt cab tandems are available in wheelbases starting at 135-in. up to any desired length. They are offered in a range of maximum GVW up to 51,000-lb., GCW up to 75,000-lb and are available on special order only.

A new heavy duty Cruise-O-Matic is offered on the F-250, F-350, and P-350 through P-500. The new two-speed Ford-O-Matic is available on the Courier and Ranchero models only. After January 1, Ford will have available a new four-speed auxiliary transmission for T-800, T-850, and T-950 models in both 175- and 192-in. wheelbases.

A special tractor package is offered on conventional, tandem, and tilt cab models 750 and up. This includes ICC-approved air brake and electrical connections, and hand control valve; tractor

protection valve and dash control; clearance lights; trailer circuit breaker and relay; emergency stop light switch and turn signals.

The line-up of models, model designations, as well as their general range of GVW ratings is substantially the same as last year. In the conventional line the series designations run from F-500 to F-1100, including nine models. GVW ratings range from 15,000-lb at the low end to 30,000-lb. The tilt cab line has series designations starting at C-550 with GVW rating of 18,000-lb, to C-1100 with GVW rating up to 36,000-lb. This group encompasses nine models.

The tandem group has five Series—T-700, T-750, T-800, T-850, T-950 with GVW ratings from 28,000-lb to a maximum optional rating of 51,000-lb.

Finally there is the group of four school bus chassis—B-500, B-600, B-700, and B-750.

It should be noted at this point that specifications data show the normal minimum GVW rating for each series. In many instances higher optional ratings can be specified, depending upon the selection of optional equipment items.

Power steering is standard on the T-700, when specified with the 302-cu in. V-8 engine, and on the remaining tandem axle models. It is available as optional equipment on all series.

Full air brakes are standard equipment on the following models: F-1000, F-1100, C-1000, C-1100, T-950. They are optional in all lines starting with 700 series.

Optional two-speed axles are available in all series, except the tandem axle line.

A wide choice of transmission options is offered, depending upon operating conditions and certain  
(Turn to page 106, please)

## FORD'S NEW TRUCK LINE

### Includes Four-Wheel Drive Models

New Ford F-600 which has GVW of 17,000 lb





Three-quarter front view of 1959 Plymouth Fury two-door hardtop

## PLYMOUTH'S NEW CARS for 1959

**P**LYMOUTH for 1959 has been completely restyled, and is more massive in appearance. As with other Chrysler Corp. cars, a considerable number of mechanical refinements have been incorporated in the new models. Also, more optional equipment has been made available.

Wheelbase on the new models is 118 in. Four-door sedan dimensions are: Overall length 208.2 in., width 78.0 in., and height 56.6 in.

The six-cylinder, 230 cu-in. engine, called the Powerflow 6, will be available on Savoy and Belvedere series. Changes made for 1959 include improved exhaust valve design; use of higher alloy steel in exhaust valve seats; and use of a higher-capacity oil pump in combination with a floating oil intake screen.

The Fury V-800 engine, of 318

cu in. piston displacement, is the basic Plymouth V-8. A two-barrel carburetor is standard. The engine has a new camshaft, giving improved low-speed torque and high-speed breathing. Warm-up time has been shortened by a modified intake manifold heat cross-over which improves heat distribution in the manifold. On the Sport Fury model this engine is standard with Super Pak—four-barrel carburetor, special camshaft, and dual exhaust. Super Pak is optional on the other V-8 models.

The new Golden Commando V-8, of 361 cu in. piston displacement, is available as an option on all Plymouth V-8 models. It includes a four-barrel carburetor, dual breaker distributor, special camshaft, and heavy-duty valve springs

and dampers, with dual exhaust.

Torsion-Aire front suspension has been further improved by incorporation of a new caster and camber adjustment cam, and use of better lubricated and sealed ball joints. Rear air suspension is an option, the air springs in this system being used in combination with conventional, but lighter, leaf springs.

Swivel swing-out front seats are supplied as standard on Sport Fury models.

Electronic headlight dimmer and self-dimming rear view mirror are among the new optional equipment. Details on these items, as well as on the front and rear suspensions, were contained in AUTOMOTIVE INDUSTRIES for September 15, page 48. ■

### 1959 PLYMOUTH ENGINES

	Powerflow 6	Fury V-800	Fury V-800 With Super Pak	Golden Commando 395
Bore (in.)	3.25	3.91	3.91	4.12
Stroke (in.)	4.63	3.31	3.31	3.38
Displacement (cu in.)	230	318	318	361
Compression Ratio	8.0	9.0	9.0	10.1
Bhp (max.) @ rpm	132 @ 3600	230 @ 4400	260 @ 4400	305 @ 4600
Torque (lb-ft, max.)	205 @ 1200	340 @ 2400	345 @ 2800	395 @ 3000
Carburetor	1 bbl	2 bbl	4 bbl <sup>1</sup>	4 bbl <sup>2</sup>

<sup>1</sup> Plus special camshaft and dual exhaust.

<sup>2</sup> Plus dual breaker distributor, special camshaft, heavy-duty valve springs and dampers, and dual exhaust.



**T**HE new Chevrolets are completely restyled with lower overall height and increased passenger room in the front seat. Sedans have been reduced in height one inch; sport models two inches. Lower body mountings and a new roof design permit this reduced overall height without sacrifice in headroom.

For 1959 Chevrolet have the Impala line; the Bel Air series; the Biscayne series which replaces the Delray, now discontinued; the station wagon series; and the two-passenger Corvette.

For improved fuel economy, the six-cylinder engine has a redesigned camshaft with reduced lift and shorter valve overlap. In addition, carburetor metering has been changed for a leaner mixture. These changes are said to result in

more usable horsepower at normal driving speeds as well as better fuel mileage.

Improvements in the V8s, ranging in horsepower from 185 to 315, include greater cooling spaces

**Chevrolet El Camino will carry a 1250 lb load in its 32½ cu ft box. Cab is fitted with passenger car appointments, a compound windshield and curved rear window.**



## Chevrolets for 1959

### 1959 CHEVROLET ENGINES

#### Standard and Optional All OHV type

Series	1100-1500-1700 (Std.)	1200-1600-1800* (Std.)	1200-1600-1800* (Opt.)
Type	In line-6	90-deg V-8	90-deg V-8
Bore (in.)	3.86	3.875	4.125
Stroke (in.)	3.84	3	3.25
Displacement (cu in.)	235.8	283	348
Induction System*	1-bbl	2-bbl	4-bbl
Compression Ratio	8.25 to 1	8.5 to 1	9.5 to 1
Bhp (max.)	135 @ 4000 rpm	185 @ 4000 rpm	250 @ 4400 rpm
Torque (lb. ft.) max.	217 @ 2000-2400	275 @ 2400 rpm	325 @ 2800 rpm

#### \* Optional Features:

	CR	283 Cu in. Bhp	Torque	CR	348 Cu in. Bhp	Torque
4-bbl Carb.	9.5	230@4000	300@3000			
Ramjet Fuel Inj.	9.5	250@5000	305@3000			
Ramjet Fuel Inj. (with special camshaft)	10.5	290@2200	290@4400			
4-bbl Carb. (with special camshaft)				11.0	300@4000	350@3000
3 x 2 Carburetor				9.5	290@4000	335@3200
3 x 2 bbl. Carb. (with spec. camshaft)				11.0	315@4000	360@3000

around the spark plugs in the 348-cu in. engines. Passages are now cast in the cylinder head through enlargement of the outer deck.

The conventional coil spring suspension has been refined at the rear for the purpose of minimizing shocks and instability that might be transmitted by suspension links. The integrated 1958 upper control arms in the system have been replaced with two specialized members. One is a curved over-riding member, pivot-anchored at the ends to the frame and banjo housing of the axle, and a lateral control bar connects the right side of the axle housing to the left side of the frame.

Changes in the air suspension system result in spring rates 40 per cent lower in the front and 15 per cent lower in the rear. Contours of the pistons on which the rubber bellows work have been altered, and the forward bellows have been reworked.

Brake lining area has been increased from 157 to 199.5 sq. in. or 27 per cent. Front brake shoes are wider by  $\frac{3}{4}$  in. and rear shoes by  $\frac{1}{4}$  in. The added width projects into the air stream for better cooling. Openings around the short-spoke wheels also provide freer air circulation.

Multiple disks replace cone clutches in the new Turboglide transmission. Six active faces are applied to the reverse clutch, eight to the forward clutch.

The second universal joint in the steering column is a yoke and trunnion type, with the trunnion a molded assembly of fabric laminations impregnated with rubber. Located immediately above the gear box, it absorbs highway vibration. Steering ratio has been increased to 28 to 1.

Tube-on-center radiators have been boosted 30 per cent in area. Dual exhaust systems are now equipped with two additional zinc-lined mufflers to soften exhaust sounds. A manually set constant throttle setting is available as optional equipment.

As in the previous five years, the Corvette will be built exclusively as



*Impala sport sedan. Note the large compound windshield and wrap-around rear window.*

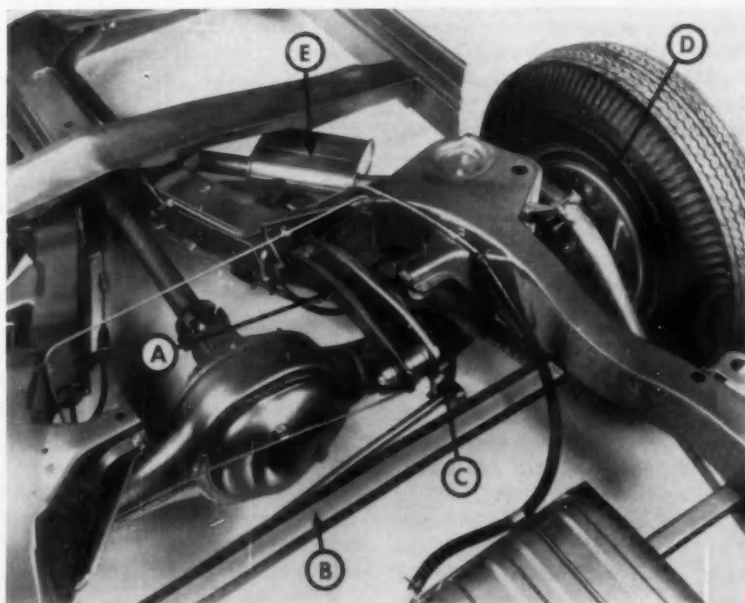
a two-seater. The principal chassis change is found in a revision of the rear suspension to provide greater handling precision, particularly during rapid acceleration and quick stops. Also, brake cooling has been improved.

Again for 1959, there is a wide choice of power trains. Five V8

engines ranging from 230 to 290 hp can be combined with manually operated three or four-speed transmissions or the automatically shifting Powerglide with varied combinations. Fuel injection is specified in two of the power packages.

The optional four-speed trans-  
(Turn to page 95, please)

**New rear suspension.** (A) Upper control arm attached to rear housing which guides vertical axle movements. (B) Frame cross member attached to side rails. (C) Second suspension control arm to control lateral movements of axle. (D) New brake with improved cooling of drum. (E) Resonator between muffler and tail pipe on V8's with dual exhaust.





1959 Dodge Custom Royal four-door hardtop sedan has a sculptured roof panel with raised rear section

## Larger Engines Offered in New Dodge Passenger Cars

**T**HE 1959 Dodges present new styling, added driver conveniences, new and larger engines, more optional equipment, and many mechanical refinements.

Series designations are: Coronet 6, Coronet V-8, Royal, Custom Royal, and Sierra and Custom Sierra station wagons. Wheelbase on all models continues at 122 in. Overall length of the sedans has been increased 3.6 in., from 213.8 to 217.4 in. Most of this is in added rear overhang. Overall width of bodies has also been increased from 78.3 to 80 in.

Perhaps the most novel feature for the driver is swing-out, swiveling front seats, offered as an option on Custom Royal models. These seats were described in *AUTOMOTIVE INDUSTRIES* for September 1, page 59. Other options are a self-dimming rear-view mirror, and an automatic headlight beam changer, both operated electronically. These latter items were described in *AI* for September 15, page 48. An

additional unusual option is a left-front-fender-mounted mirror which can be controlled from inside the car by moving a lever on the instrument panel. The lever moves the mirror by means of three stainless steel cables.

Mechanically, the outstanding

features are a new engine of 326 cu in. piston displacement and enlarged versions of the Ram Fire and D-500 engines.

The new engine, used in the Coronet V-8, has a compression ratio of 9.2 to 1, compared to the 9.0 to 1 of the prior 325 cu in. V-8. Hydraulic valve tappets are used.

Royal and Sierra models have a 361 cu in. V-8, an enlarged version of the Ram Fire 350 cu in. V-8 used in Custom Royal models last year. Combustion chambers have been changed to improve performance, and pistons and pins modified for increased durability. Custom  
(Turn to page 116, please)

### 1959 DODGE ENGINES

Engine	Coronet 6	Coronet V-8	Royal and Sierra	Custom Royal	Optional V-8 All Models	
	Getaway 6	Red Ram V-8	Ram Fire V-8	Custom Sierra Super Ram Fire	D-500	Super D-500
Bore (in.)	3.25	3.95	4.12	4.12	4.25	4.25
Stroke (in.)	4.63	3.31	3.38	3.38	3.38	3.38
Displacement (cu in.)	230	326	361	361	363	363
Compression Ratio	8.0	9.2	10.1	10.1	10.0	10.0
Bhp (max.) @ rpm	135 @ 3600	255 @ 4400	285 @ 4800	305 @ 4600	320 @ 4600	345 @ 5000
Torque (lb-ft, max.)	205 @ 2100	350 @ 2400	300 @ 2400	400 @ 2800	420 @ 2800	420 @ 3600
Carburetor	1 bbl	2 bbl	2 bbl	4 bbl	4 bbl	Two 4-bbl*

\* The Super D-500 has a special camshaft and heavier valve springs, in addition to two four-barrel carburetors.

# 1959 Dodge Trucks Include New Sweptline Pick-Ups



*The completely new Dodge Sweptline half-ton pick-up is offered with a 120-hp six-cylinder or a 205-hp V-8 engine*

**T**HE 1959 Dodge trucks feature six and eight-cylinder engines with 11 different horsepower ratings ranging from 113 to 234. Maximum gross vehicle weights on the new M-series models range from 5100 to 49,000 lb—an increase of 3000 lb for tandems—and gross combination weights up to 65,000 lb.

Two new 318-cu-in. V-8 engines, Sweptlines—are powered by a 120-hp six-cylinder or a 205-hp V-8 engine. Available in half, three-quarter, and one-ton models, the Sweptlines have body lengths from 6½ to 9 ft, capacities from 59.7 to 84 cu ft, and payloads from 1775 to 3475 lb.

The Sweptside 100 pick-up again will be available. Basic truck model designations are essentially the same as last year.

Two new 318-cu-in. V-8 engines, with 8.25-to-1 compression ratio, are offered this year. A shunt-type oil filter, integral with the engine, is standard on these V-8's.

The new 318-cu-in. V-8 engine with 205 hp is available on D100, D200, D300, W100, W200, P300, and P400 models. The new heavy-duty 318-cu-in. V-8 engine with 207 hp is available on D400, S400, D500, S500, W300 and W500 models.

A 210-hp heavy-duty 315-cu-in. V-8 engine with double rocker

shafts is standard on C500 and C600 models, and is available on D400, S400, D500, S500, D600 and S600 models.

L-head, six-cylinder engines are available for all 100 through 600 series models except cab-over-engine.

A new three-speed heavy-duty transmission, standard on D200, W100, and W200 models, also is available on D100 models. A new three-speed extra-heavy-duty transmission is standard on P300 and P400 models, and available on D200, W100, and D300's. A four-speed transmission is standard on D300's.

The pushbutton LoadFlite transmission is available for all low-tonnage conventional and all forward-control units, as well as in V-8 powered W100, W200, and W300 models. Six-speed Torqmatic transmission is available on D500, S500, D600, S600, D700 and S700's. This automatic transmission features a built-in torque converter hydraulic retarder.

The four-speed auxiliary transmission, formerly available only on D900 and T900 models, now is available on D800 and T800's. It provides maximum flexibility in loaded, off-the-road service or at unloaded highway speeds. A three-speed auxiliary transmission is still available for all high-tonnage conventional and tandem models.

Used on some models is a new hydraulically-operated clutch. The master cylinder for the clutch is mounted on the firewall next to the brake master cylinder for easy service access. All 700 series models have an improved 13-in. spring-cushioned clutch. The 14-in. clutch on 800 and 900 series units has 192 sq in. of lining area.

Brake system on the D100 models is completely new, and has a total lining area of 192 sq in. Dash-mounted power brake booster is available as extra equipment.

The new T800-HD model with hydraulic brakes as standard has a total lining area of 871.28 sq in. Air brakes with a total lining area of 920.75 sq in. are now standard on T900 models. With extra-equipment 11,000-lb-capacity front axle and air brake, T800-HD and T900 models have a total lining area of 1004.85 sq in.

Brake and clutch pedals are new and of the suspended type. ■

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Washington, D. C., may get the next world's fair. It would be larger than the current Brussels fair, and on the order of the 1939 New York fair in size. Year: 1963. Site: Bolling Field (Air Force) and Anacostia Air Station (Navy), which are being abandoned.

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# Missile Programs Analyzed at ARS Detroit Meeting

**M**ORE than 300 companies in the Michigan area are actively engaged in over 40 missile programs as prime and sub-contractors, according to Harlan H. Hatcher, president, University of Michigan. This estimate was given in his opening remarks at the forum on the impact of space flight on industry, held in conjunction with the fall meeting of the American Rocket Society in Detroit in September.

Among the principal speakers, Dr. George E. Valley, Jr., chief scientist, Department of the Air Force, devoted his luncheon talk entirely to the significance of the National Aeronautics and Space Agency, together with other top level groups engaged in Research & Development activities. Appraising the changes in top level organization, Valley concluded that there is a definite tendency in the Government to centralize research and development. He also feels there is an effort to insure that R & D is presented at the highest policy making levels of the Government. Another trend is an increased emphasis on civilian direction of R & D.

## Critical of Space Flight Progress

The forum on space flight evidenced some criticism of the way things are going. One of the reasons advanced for interplanetary exploration is the matter of national prestige, this being one of the points made by Brig-General Homer Boushey, USAF director of advanced technology. K. J. Bos-

sart, Convair-Astronautics, argued that the only incentives for exploring other planets are: contribution to scientific knowledge, and enhancement of national prestige. He cannot foresee any economic returns from such exploration and pooh-poohed schemes aiming at economic exploitation in this area.

Bossart believes that the effect of space travel on industry will be to accelerate two dubious current trends. One is that design offices and test labs will expand at the expense of manufacturing facilities; the other that capital expenditures will grow out of proportion manufacturing costs.

Too many of the space research plans being formulated today may hinder future advances in astronautics, warned John De Nike, The Martin Co. He is afraid we will pursue too many diverse paths for which we have neither the time nor the resources. The important objective is placing man in space and letting the missions evolve as needs arise.

Dr. Valley visualized that industry will be called upon to build only a few special space vehicles. Because of their complexity, we should look forward to projects in which industry would team up with basic research groups such as those in universities. There are a few areas which may have promise of larger production of standardized items. One of these might be in the area of booster rockets for first stage boosters. Another might be in the area of data recording equipment as well as telemetering transmitters and receivers. However, he does not see any large pro-

duction volume in prospect for such electronic devices.

## Control System Developments

Considerable attention was given to various aspects of ramjet engines. Hugh J. Davis and K. P. Price, Boeing Airplane Co., touched on ramjet speed-control in missiles systems. They concluded that it is possible to make refinements and improvements in existing systems by careful analysis of the empirical results of laboratory simulation.

An introduction to the control of ramjet engines was given in a paper by W. H. Henley, Marquardt Aircraft Co. It outlined the main characteristics of the engine from the standpoint of the control engineer. In a comparison of pneumatic-hydraulic and electronic controls, reasons were given for selecting the former type. One of the chief reasons, stated by the author, is that hydraulic-pneumatic components have excellent reliability under thermal and vibrational conditions which electronic components are unable to endure. In addition, it is claimed that hydraulic-pneumatic system components are more accurate due to the direct use of pressure parameters and independence of external power supply.

The Bendix system for ramjet fuel control was described by F. A. Heintz, Jr., Bendix Aviation Corp. His paper was concerned with a detailed description of the functions of the nitrogen shut-off valve, the main fuel regulator, and the fuel flowmeter.

Control system requirements for supersonic air-breathing engines were covered by H. L. Richardson, Wright Aeronautical Div. He touched on the effects of stringent environmental conditions, wide engine operating ranges, as well as airframe-engine interaction on control system requirements.

The Redstone rocket engine is a fixed thrust, bipropellant system of the 75,000-lb class, employing li-

*(Turn to page 100, please)*

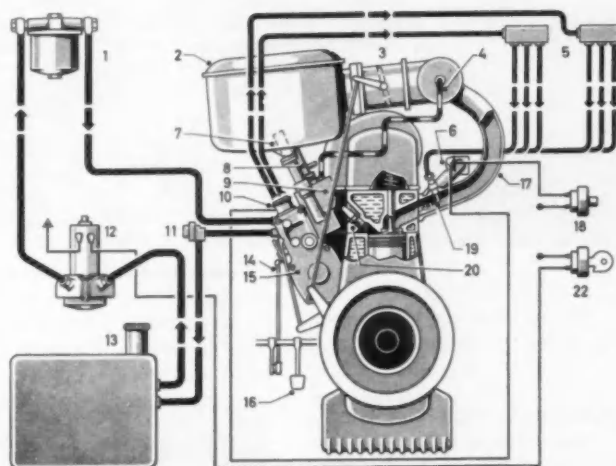
# Improved Fuel Injection for Mercedes-Benz Engine

**D**AIMLER-BENZ has developed a fuel injection version of its 133.9-cu in. six-cylinder carburetor engine that gives a 9 per cent increase in output and torque. Maximum ratings of the new Mercedes-Benz 220 SE are 130 hp at 5000 rpm and 146.1 lb/ft torque at 3800. The unusual fuel system employs a two-plunger injection pump, produced in conjunction with Bosch, that is driven by a double cam running at half engine speed.

Each plunger feeds a separate distribution block which in turn delivers fuel in exactly equal quantities to the injector nozzles for three cylinders simultaneously, the second block supplying the other three. Volume of fuel, controlled primarily by throttle pedal, is also regulated by a centrifugal governor on the engine.

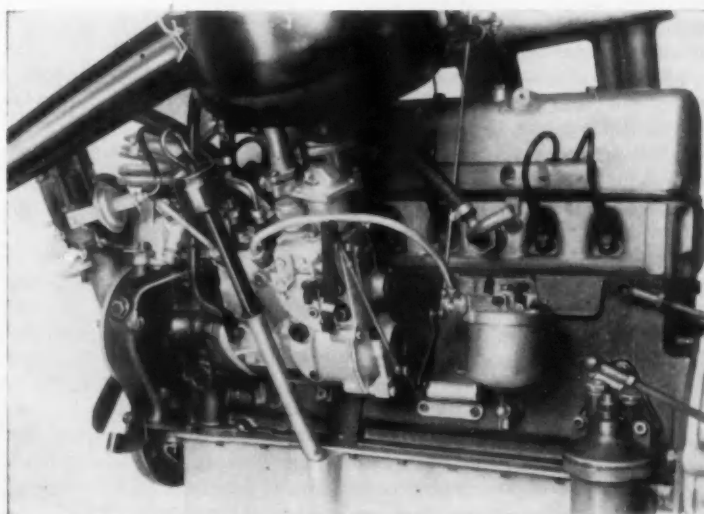
This combination adjusts delivery in accordance with engine speed even though the throttle opening may be constant, and is claimed to eliminate the time lag between throttle depression and acceleration. It also cuts off the fuel supply on the closed-throttle over-run, thereby improving fuel consumption and producing an odorless exhaust while coasting. The governor restarts fuel delivery when the engine speed drops below 1500 rpm to avoid jerking.

The amount of fuel injected is also automatically regulated by a water thermostat that enriches the mixture for cold-weather starting; an air thermostat that adjusts delivery according to the temperature of the inducted air; and a barometric pressure control that corrects for altitude. A magnetic regulator acts as an additional "choke" in freezing weather. ■



FUEL FLOW DIAGRAM OF MERCEDES 220 SE

- |                                       |                              |
|---------------------------------------|------------------------------|
| 1—Main fuel filter                    | 11—Fuel pressure compensator |
| 2—Air filter                          | 12—Fuel feed pump            |
| 3—Throttle housing                    | 13—Fuel tank                 |
| 4—Idling air pipe                     | 14—Throttle control rod      |
| 5—Fuel distributor blocks             | 15—Injection pump            |
| 6—Thermostat for cold-starting magnet | 16—Accelerator pedal         |
| 7—Air thermostat                      | 17—Intake pipe               |
| 8—Water thermostat                    | 18—Starter button            |
| 9—Air pressure gage                   | 19—Injection nozzle          |
| 10—Starting magnet                    | 20—Spark plug                |



The two-plunger injection pump is on the left side of the engine



*Koehring Transverse Finisher is operated by one man*

**A**T press time, preparations were well under way for start, on October 15, of traffic over the test pavements of the American Association of State Highway Officials' road test site near Ottawa, Ill. It is the largest experimental and research highway project ever undertaken.

Some 60 trucks and tractor-semi-trailer combinations are scheduled to move over five of the six test loops about 18 hours a day, six days a week, for two years. During this time, electronic and other recording instruments will collect data on the behavior of the pavements, and automatic data handling equipment and high-speed computers will analyze these data. It is estimated that the project will cost about \$22 million.

Results of the tests will be made known sometime in 1961 to highway administrators, highway engineers, automotive manufacturers, and lawmakers, and are expected to influence the design and construction of highways throughout the country.

Construction of the test pavements has been going on, under strict controls, for the past two years. The tests are being conducted under the sponsorship of the AASHO, and are under the

## Trends in the

By Kenneth Rose

administration of the Highway Research Board of the National Academy of Sciences, National Research Council.

### New Earthmoving Equipment Shown by Koehring Co.

More than a million dollars' worth of earthmoving equipment was recently displayed and demonstrated by Koehring Co. to contractors, dealers and the trade press at the Koehring Proving Ground near Milwaukee. Included in the equipment shown were 11 new models, as follows:

The 205 Skooper, a two-cubic-yard loader that can do practical standstill loading with high lift and 360-deg turntable swing, having some of the advantages of a shovel along with the features of a front end loader;

## CONSTRUCTION EQUIPMENT INDUSTRY

The 305 Cruiser Crane, using a single engine and traveling at 18 mph, with torque converter drive and power steering, and having 25-ton lifting capacity at 12-ft working radius;

The 330 Truck Crane, with 30-ton lifting capacity at 12-ft working radius, 100-ft main boom, power removable counterweight, and power boom loading (standard) or power load lowering (optional);

The 435 Truck Crane, with four-axle truck carrier, outriggers sliding on rollers, 35-ton lifting capacity at 15-ft working radius, 120-ft main boom, and counterweight removable by lowering A-frame with engine power;

The 545 Sprawler, a crawler crane with easily-set pivoting outriggers, lifting 30 tons without outriggers or 45 tons (14 per cent more than its own weight) with

*(Turn to page 102, please)*

# Aluminizing Engine Valves With Induction Heating

**T**HE initial high cost of mass-producing aluminized valves has brought about a method of metallizing and high-frequency induction heating which provides high quality standards and reduction in costs, while retaining the benefits of aluminum coating. This latest technique, now being used at Thompson's new valve plant in Cleveland, Ohio, was developed jointly by Thompson Products, Inc., Valve Div., and Allis-Chalmers Mfg. Co.

Original efforts involved the immersion of the valves in molten salt for heating to 1400 F, and then dipping the valve heads in molten aluminum. An evaluation of this method disclosed (1) about 10 per cent defective parts due to non-uniform coating on the valve area, (2) costly valve inspection and equipment maintenance requirements.

Faced with the problem of exces-

By Miles Detling  
Facilities Engineer  
Valve Division  
THOMPSON PRODUCTS, INC.

and

Ottmar W. Noeske  
Application Engineer  
Rectifier Section  
ALLIS-CHALMERS MFG. CO.

sive manufacturing costs using this process, Thompson valve engineers sought a more economical method with which to mass-produce a high quality aluminized engine valve.

The first step in a series of experimental programs resulted in the use of metal spraying equipment in lieu of immersing the valve heads in molten aluminum.

Degreased and preheated (400 F) valves were progressively conveyed into an aluminum spray area

consisting of an oxygen-acetylene metallizing gun. Metal-sprayed aluminum wire provided a uniform coating of iron-free aluminum upon the valve seat area.

After spraying, the valves were manually loaded and positioned into specially-designed horizontal conveyors located about 18 in. above the salt furnace. The valves were then conveyed through the salt furnace and heated to desired temperature.

While a slight reduction in manufacturing costs was realized, it was felt that continued study of the process was necessary to obtain more uniform quality of valves and further reduction in costs.

It was evident that investigation must be made concerning the method of applying heat to the valve head. Subsequent development work disclosed that the solution to this problem was the application of induction heating.

With other installations of induction aluminizing production lines, it was noted that there remained one more major hurdle to be overcome. These systems used a 10-kc induction generator in the high heat stage which inherently through-heated the valve head and caused runout of the head to the stem. It was therefore necessary to have 100 per cent inspection.

With practical understanding of the whole problem brought about by this research, investigation was made of the use of 450-kc induction heaters. By making use of the skin effect principle inherent with the higher frequencies, it was possible to localize the heat to the immediate valve seat area where aluminizing was desired. Since heat was not applied nor transmitted to the inner section of the valve head, the problem of head to stem warping was eliminated. This, in turn, meant that no longer was full inspection required, while high quality control

(Turn to page 106, please)

Closeup of work coil where aluminized valves are heated to about 1600 F, forming a uniform aluminum-iron alloy layer on the valve seats





# • • INDUSTRY STATISTICS • •

## WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending		Year to Date	
	Sept. 27	Sept. 20	1958	1957
<b>PASSENGER CAR PRODUCTION</b>				
Rambler	4,575	5,265	132,108	71,977
Total—American Motors	4,575	5,265	132,108	71,977
Chrysler	366	488	36,724	94,376
De Soto	725	1,132	25,987	91,718
Dodge	2,181	2,770	76,972	226,198
Imperial	78	123	8,651	30,497
Plymouth	4,759	5,089	270,154	518,592
Total—Chrysler Corp.	6,109	9,602	418,198	961,372
Edsel	38		8,541	42,165
Ford	7,109	3,641	662,709	1,184,564
Lincoln			17,714	29,088
Mercury			84,949	228,498
Total—Ford Motor Company	7,147	3,641	773,913	1,482,325
Buick	4,124	6,185	100,314	296,474
Cadillac	1,105	1,016	92,063	120,913
Chevrolet	11,504	3,609	900,667	1,124,515
Oldsmobile	4,753	4,505	215,723	296,668
Pontiac	1,522	3,051	143,427	262,692
Total—General Motors Corp.	23,008	18,366	1,512,194	2,102,462
Packard			1,723	4,618
Studebaker			21,601	46,801
Total—Studebaker-Packard Corp.			23,324	51,419
Checker Cab			2,120	3,011
Total—Passenger Cars	42,839	36,674	2,881,857	4,673,566

## TRUCK AND BUS PRODUCTION

Chevrolet	5,353	5,358	194,210	256,467
G. M. C.	959	1,025	43,642	50,568
Diamond T	143	133	4,027	4,167
Divco	70	70	2,086	2,319
Dodge and Fargo	410	767	40,473	56,813
Ford	2,453	1,738	153,345	263,012
F. W. D.	25	24	922	874
International	1,895	1,696	68,166	92,116
Mack	289	244	10,945	12,149
Studebaker	100	100	7,117	10,290
White	386	343	12,134	14,530
Willlys	2,099	2,318	63,200	55,842
Other Trucks	50	50	2,155	3,208
Total—Trucks	14,212	14,069	602,422	825,222
Buses	70	65	2,482	3,160
Total—Motor Vehicles	57,121	51,008	3,486,771	5,501,948

## 1958 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	Seven Months		
	July	1958	1957
<b>Vans</b>			
Insulated and refrigerated	335	1,953	2,836
Steel	17	213	412
Aluminum	318	1,740	2,424
Semi-insulated	49	314	399
Steel	10	314	68
Aluminum	39		331
Furniture	91	996	1,086
Steel	76	996	989
Aluminum	15		97
All other closed top	1,337	8,674	11,823
Steel	461	3,015	5,584
Aluminum	876	8,659	6,239
Open-top	178	995	1,901
Steel	104	536	942
Aluminum	74	459	959
Total—Vans	1,900	12,932	18,045
<b>Tanks</b>			
Non-and low pressure			
Petroleum			
Carbon and alloy steel	145	1,283	
Stainless steel	12	121	
Aluminum	116	747	
Total—Petroleum	273	2,151	3,116
Chemical, food, fluid solids	27	299	
All other, incl. aircraft refuelers	48	211	
High pressure (LPG, chemicals, etc.)	27	168	
Total—Tanks	372	2,929	4,213
<b>Pole, pipe and logging</b>			
Single axle	28	190	342
Tandem axle	65	286	482
Total	93	476	824
<b>Platforms</b>			
Racks, livestock and stake	124	897	1,386
Grain bodies, all types	99	516	941
Platforms (flats), all types	540	3,143	4,580
Total—Platforms	763	4,556	6,907
<b>Low-bed heavy haulers</b>			
Dump trailers	195	1,432	2,026
All other trailers	262	1,483	1,411
Total—Complete Trailers	3,880	24,976	35,696
Trailer chassis <sup>1</sup>	234	1,612	2,029
Total—Trailers and Chassis	4,114	26,788	37,695

<sup>1</sup> Sold Separately.

## 1958 NEW REGISTRATIONS

Based on Data from R. L. Polk & Co.

Arranged in Descending Order According to the Eight Month 1958 Totals

### NEW PASSENGER CARS

Make	August		July		August		Eight Months	
	1958*	1957*	1958*	1957*	1958†	1957†	1958†	1957†
Chevrolet	105,282	115,781	116,361	880,539	972,571			
Ford	81,933	85,104	122,468	667,589	1,022,072			
Plymouth	33,561	35,579	84,421	270,933	429,162			
Oldsmobile	21,382	25,147	26,345	214,612	286,305			
Buick	14,224	17,835	29,485	173,683	278,783			
Pontiac	16,256	17,615	24,806	156,231	223,453			
Rambler	15,301	17,587	7,208	111,406	60,784			
Mercury	11,871	12,603	22,086	95,345	190,542			
Dodge	10,537	11,450	22,345	90,712	163,186			
Cadillac	8,763	10,303	10,962	88,111	96,054			
Chrysler	4,999	5,235	8,147	42,271	74,225			
De Soto	3,560	3,806	7,676	33,676	73,471			
Studebaker	2,991	3,399	5,711	27,332	43,510			
Edsel	2,123	2,629		26,758				
Lincoln	1,598	1,770	2,612	18,836	24,468			
Imperial	934	1,121	2,563	10,496	23,847			
Metropolitan	1,177	1,169	1,309	8,069	7,755			
Packard	187	226	394	2,067	4,165			
Misc. Domestic	394	324	1,257	2,266	14,837			
Foreign	33,181	31,902	18,458	216,337	115,093			
Total—All Makes	379,856	400,286	488,633	3,139,500	4,094,090			

\* Does not include data for Oregon.

† Does not include data for Oregon for July or August.

### NEW TRUCKS

Make	August		July		August		Eight Months	
	1958*	1957*	1958*	1957*	1958†	1957†	1958†	1957†
Chevrolet	23,409	23,044	27,037	168,967	200,142			
Ford	18,157	17,846	24,141	134,562	184,678			
International	7,331	7,325	8,738	67,796	82,082			
G. M. C.	9,177	4,773	5,260	35,504	42,482			
Dodge	2,921	3,263	4,020	25,090	32,193			
Willlys Truck	983	937	1,099	8,140	9,935			
White	803	878	1,300	7,826	10,804			
Mack	876	1,209	1,158	7,670	8,956			
Willys Jeep	656	686	590	4,042	4,216			
Studebaker	299	383	501	2,944	4,808			
Diamond T	251	275	304	1,936	2,329			
Divco	139	175	181	1,447	1,061			
Brockway	70	74	55	540	463			
Kenworth	87	49	57	500	685			
Peterbilt	28	47	43	271	361			
F. W. D.	28	31	33	264	325			
Misc. Domestic	55	81	65	538	566			
Foreign	2,603	2,297	1,374	16,809	6,737			
Total—All Makes	63,961	63,383	75,946	474,953	576,442			

**R** EPORTS on developments in tractors and other equipment for the farm and for construction and industry, with indications of some ideas under development, highlighted the Society of Automotive Engineers' National Farm, Construction and Industrial Machinery Meeting, held in early September at Milwaukee. Exhibits, heretofore limited by the small space available in hotel rooms, spread out in Milwaukee's Auditorium, with 48 companies displaying their products.

Farm equipment manufacturers are working upon pelleting of hay, and the handling of the pellets like ear corn, it was revealed. Army engineers told of work in developing construction machinery that can be transported by air. Engineering progress in engines and tractor components was discussed; and the Production Forum brought out panel discussions of latest manufacturing techniques.

### Clutch Characteristics

L. P. Ludwig, of Twin Disc Clutch Co., speaking of the engagement characteristics of wet type clutches, developed a theoretical analysis, and showed that reducing the peak rates of heat generation would improve the ability to absorb high energy loads. This might be done by using an initially low clutch clamping pressure and increasing it to high pressure at the end of the engaging cycle. Test results showed that the energy absorption capacity, for a single engagement of phosphor bronze plates mated to steel, was vastly greater for "worn in" plates than for new plates. Radial grooves on the friction face lower the dynamic coefficient of friction, and have no appreciable effect upon the static coefficient. Average dynamic coefficient of friction was independent of load in the tested range. The coefficient of friction was constant during a large part of the engaging cycle, and increased rapidly between 115 fpm and zero fpm.

In evaluating dry clutch torque, J. R. Prosek and H. M. Barber, International Harvester Co., de-

## Variety of Subjects Discussed at

By Kenneth Rose

# SAE Milwaukee Meeting

scribed tests that showed snapped-engagement peak torque values of about 4 times normal rated engine torque when the clutch was used in conjunction with a torque converter, as contrasted to a peak of about 10 times with a conventional gear driven tractor. With organic friction materials, clutch shaft peak torque values could be from 4 to 5 times rated engine torque; while with ceramic materials, peaks might be 10 to 12 times engine torque.

### Hydraulic System Trends

Hydraulic systems, required to produce greater performance from smaller packages at reduced unit cost, are going to more sophisticated designs using greater speeds, pressures, and capacities, P. C. Mortenson, Vickers Inc., said. Pump speeds rarely exceeded 500 rpm 35 years ago; 20 years ago they were about 1200 rpm. Today, speeds of 2000 to 4000 rpm for small pumps, 1800 to 3000 rpm for intermediate, 1500 to 2100 rpm for large sizes, and automotive power-steering pumps operating in excess of 10,000 rpm, are commonplace. Pump pressures have risen from several hundred psi to about 2000 psi in the mobile field. Cost per horsepower has decreased considerably.

Power steering has become very popular on the American passenger car since 1951, and a similar trend is now developing on all commercial and agricultural machinery. Hydraulic systems of the future will probably be central systems, delivering fluid at various rates to individual circuits; remotely controlled, perhaps automatically; and will use higher system pressures in the interest of overall system efficiency. The hydrostatic transmission, converting the energy of a

pressurized fluid into torque, is receiving attention in the mobile field.

### Design and Research

W. J. Adams, Jr., Central Engineering Department, Food Machinery and Chemical Corp., described a research vehicle designed for study of steering and traction systems by placing them in the same environment (the vehicle) for tests. J. B. Peyrot, H. G. Knudsen, and L. M. Richards, Bucyrus-Erie Co., also told of solving design problems on crane and excavator booms with the aid of a computer, whereby 7200 calculations were made for 5 side loads, 10 boom angles, 16 boom lengths, and 9 boom stations.

### Tractor Design

The Wagner four-wheel drive tractor, a new type consisting of two separate bogies joined by a center-hinge, was described by J. Burke Long and Elmer A. Wagner, of Wagner Tractor, Inc. It is steered from the center, equidistant from both axles, and two vertical steering pins are actuated by one hydraulic cylinder. The center-hinge permits each bogie to oscillate freely around the other up to a predetermined distance. Engine power is transferred to the drive shafts through a gear box and chain and sprocket drives.

(Turn to page 112, please)

## Preview of

# 1958 METAL SHOW and Congress

**N**EARLY 500 industrial exhibits and over 150 technical presentations will be featured at the 40th National Metal Exposition and Congress, sponsored by the American Society for Metals.

The show, to be held in Cleveland's Public Auditorium, October 27-31, will display approximately \$5 million worth of new materials, metalworking machines, heat treating equipment, and quality control products. It is expected to attract an estimated 50,000 visitors from all of the 48 states, Canada and several foreign countries.

### Technical Papers

Among the 150-odd technical presentations, the ASM itself will sponsor over 50 papers, plus 35 seminar and special session talks.

A new feature of the Congress will be the first "Billy Woodside Memorial Panels," honoring the memory of an ASM founder-member. These are being arranged to appeal to management and production men in metalworking, as well as to metals engineers and researchers.

A highlight of the Congress will be a special three-day seminar in the Wade Park Manor on "Residual Stresses," held the last two days of the show and for one day thereafter.

On the two days prior to the opening of the show, October 25-26, the ASM will sponsor a seminar on "Magnetic Properties and Alloys," at the Statler-Hilton. The special speaker on Saturday night, October 25, will be Dr. G. W.

Rathenau of the University of Amsterdam. He will speak about "Time Effects in Magnetization."

Headquarters of the ASM will be the Hotel Cleveland and the Statler-Hilton jointly.

Enlarging the scope of the technical meetings will be concurrent programs by seven cooperating groups, as follows:

### Metallurgical Society

The Fall Meeting of the Metallurgical Society, sponsored by the Institute of Metals Division, American Institute of Mining, Metallurgical and Petroleum Engineers, will feature four simultaneous meetings, Monday through Thursday, October 27-30, to be held in the Pick-Carter Hotel. Included are the AIME's Iron and Steel Div. and its Extractive Metallurgy Div. Eighteen subjects are on the calendar, in addition to 16 sessions for presentation of abstracts.

### Society For Nondestructive Testing

More than 50 technical papers will be presented on the program of the Society for Nondestructive Testing. The SNT will hold meetings Sunday, October 26 through Friday, October 31, at the Hotel Manger.

### Industrial Heating Equipment Association

There will be four speakers at the meeting of the Industrial Heating Equipment Association, Tuesday morning, October 28, in the Statler-Hilton. Theme will be "Economics and Applications of Modern Industrial Heating."

### Metal Powder Industries Federation

The Metal Powder Industries Federation program is scheduled for Wednesday afternoon, October 29, in the Hotel Cleveland. The Metal Treating Institute will conduct a morning program on Thursday, October 30, also in the Hotel Cleveland.

### Special Libraries Association

Metals Division of the Special Libraries Association will meet Thursday and Friday, October 30 and 31. Two mornings will be devoted to technical paper presentations at the Pick-Carter Hotel. On the first afternoon the group will tour Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, and on the second afternoon will inspect Republic Steel Corp.'s new research laboratory near Cleveland.

### American Society for Testing Materials

The Metal Powder Committees of the American Society for Testing Materials will meet in the Hotel Manger. Nine topics will be discussed during Tuesday and Wednesday meetings.

### American Society for Metals

A highlight of the annual meeting of the ASM, to be held Wednesday morning, October 29, in the Statler-Hilton, will be the election of officers. Delivery of the Campbell Memorial Lecture will also take place at that time. Lecturer will be Dr. Peter Payson, assistant director of research, Central Research Laboratory, Crucible Steel Co. of America. He will talk on "Tempered Alloy Martensites."

### Show Hours

Some of the many items to be exhibited at the show are previewed on the following pages. Hours for the show in Cleveland's Public Auditorium will be 12:00 noon to 10:30 pm Monday, Tuesday, and Wednesday, October 27-29; and 10:00 am to 6:00 pm, Thursday and Friday, October 30-31. ■

What's **NEW** at the **40<sup>th</sup>**

CLEVELAND

# National Metal Show

FOR ADDITIONAL INFORMATION  
please use reply card at back of issue

OCTOBER  
27-31

## Optical Pyrometer

The Pyrometer Instrument Co. will display the Pyro Micro-Optical Pyrometer and the Model DR-35 Pyro Surface Pyrometer, among other devices.

The first instrument is designed to meet the demand for higher degrees of accuracy in the measurement of temperatures over 1300 F. It is a multi purpose instrument capable of measuring temperatures of targets less than 0.001 in. in diameter and,

by means of supplementary lenses, can be adjusted for focal distances varying from five inches.

The surface pyrometer is a double range instrument designed for plant and laboratory surface and sub-surface temperature measurements alike. The 4 $\frac{1}{4}$  in. indicator has two scale ranges in different colors; the low range from 0-500 F is drawn in black and is sub-divided into five degree divisions; the high range is calibrated in red from 0-1500 F. The

meter automatically corrects itself for changes in room temperature on both scales and assures an accuracy of 1 $\frac{1}{2}$  per cent.

Circle 31 on postcard for more data

## Variable Speed Motor

A compact, footless Varidrive with NEMA style "C" or "P" face-type mounting bracket will be on exhibit in



U. S. Electrical Motors variable speed drive

the U. S. Electrical Motors display. This variable speed motor, designated type VEV, features quick, accurate alignment to the driven equipment. It is suited for applications such as turbine pumps, mixers, etc.

Circle 32 on postcard for more data

## Gearless Drill Heads

Zagar, Inc. will demonstrate and explain its line of fixed center gearless drill heads. These gearless heads were designed to allow gang drilling of holes on close centers. There is no limit to the number of holes that can be drilled, reamed or tapped. Two or more diameters can be drilled with one head and any machinable material can be handled.

Circle 34 on postcard for more data



Sentry furnace for hardening high carbon, high chrome, high speed tool steels

## Electric Furnaces For Hardening High-Speed Steels

An "on the spot" demonstration of hardening sample high carbon, high chrome or high-speed tool steels will be a feature of the Sentry exhibit. The atmosphere required for hardening these steels without scale or decarb is produced by Sentry Diamond

Blocks. With proper automatic temperature control equipment a temperature range of 300 to 2500 F is available making this furnace suitable for general purpose heat treating. *The Sentry Co.*

Circle 33 on postcard for more data



What's **NEW**

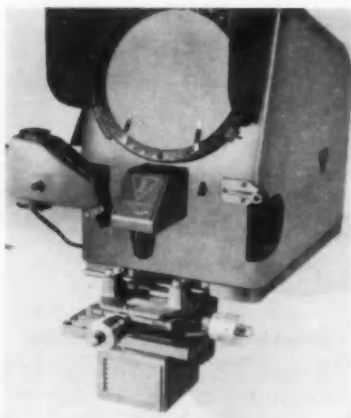
at the **40<sup>th</sup>**

## National Metal Show

CLEVELAND

OCTOBER  
27-31

FOR ADDITIONAL INFORMATION  
please use reply card at back of issue



Bausch & Lomb Bench Comparator

### Bench Comparator

Bausch & Lomb will show their Bench Comparator with two major accessories, a Surface Illuminator and Protractor Ring. The ring consists of a fixed ring assembly, graduated ring, vernier scale, and clamp arrangement. The ring in which the ground glass screen or chart is held is rotatable within the fixed ring. The illuminator consists of a 50w, 115v lamp, a fixed condensing lens system, a mirror and a focusable projection lens. The projection lens concentrates the available light on the area covered by each objective used with the Bench Comparator. *Bausch & Lomb Optical Co.*

Circle 35 on postcard for more data

### Dewpoint Equipment

"Autocarb" dewpoint equipment for carbon control will be unveiled by Surface Combustion Corp. A demonstration of the equipment which innovates an expanded range of dewpoint value measurement, encompassing zero to ambient temperatures will be featured.

Heat treating furnaces and atmosphere generating equipment used in conjunction with the dewpoint control equipment will also be displayed.

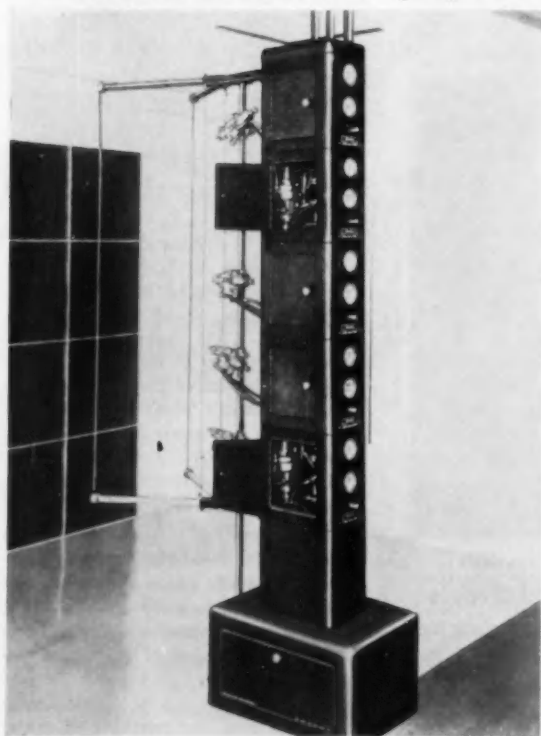
Circle 37 on postcard for more data

### Vernier Height Gage

A vernier height unit called the Starrett No. 254 Master Vernier Height Gage will be among the many items on display in the Starrett booth. It has a long, 50-division, flush-fitting vernier; full length slide adjustment with quick-adjusting screw release; vibration proof design with natural grip base and a fine adjustment knob on the base. Also, direct reading design, no-glare finish, hardened and stabilized master bar and other precision features. It is available in 12, 18 and 24 in. sizes. *The L. S. Starrett Co.*

Circle 38 on postcard for more data

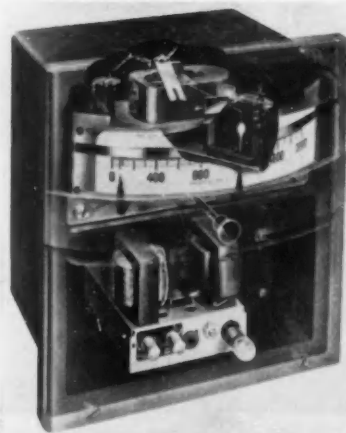
### Modular Electrostatic Spray Painting System



The Binks display will feature the new Binks Modular Electrostatic spray painting system shown in the accompanying photograph. Other items in this display will include rotary automatic spray painting equipment with electric timers and conveyor, a new paint heater and Kayo and Pogo series paint pumps which are capable of delivering paint at a 2 to 4-1 ratio. (*Binks Mfg. Co.*)

Circle 36 on postcard for more data

### Temperature Controller

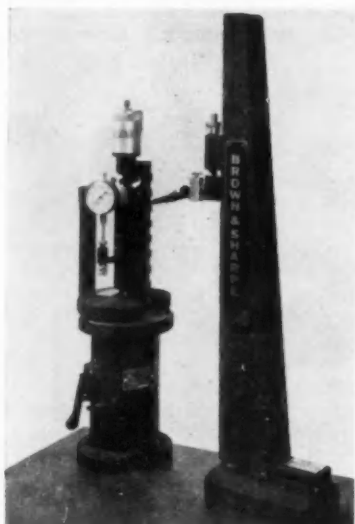


Minneapolis-Honeywell Regulator Co. will display the Pyr-O-Volt Controller. This millivoltmeter-type instrument provides economical proportioning control of electric furnace temperatures. The Ultra-Violet Protectoglo system, a flame scanner with many applications and Electro-Line three-mode control units for position-proportioning control in industrial electric heating will complete the exhibit.

Circle 39 on postcard for more data

## Height Indicator

Brown & Sharpe will display, among many other indicating devices, the Hite-Icator. This device features

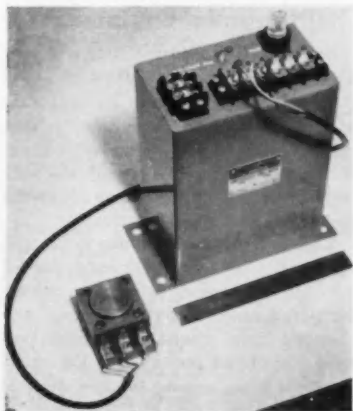


*Brown & Sharpe Hite-Icator*

a sensitive dial indicator which is actuated by the gage-block column itself, as it moves up and down over the one inch range of the micrometer head. It is therefore easy to position within a thousandth of an inch. *Brown & Sharpe Mfg. Co.*

Circle 40 on postcard for more data

## Proximity Limit Switch



Westinghouse will show, among other devices, the Proximity Limit Switch. Using a 1/2 and 2 in. maximum sensing head, this static device is designed for applications where limit switches must be placed on the movement of a machine or a machine part. (*Westinghouse Electric Corp.*)

Circle 41 on postcard for more data

## Testing Unit For Small Ferrous Parts

The NQ-242 testing unit employs the water-suspendible magnetic particle inspection method, either visible or fluorescent. And provides a rapid means for production testing of small ferrous parts up to 24 in. long. The unit, which operates from 220/440 v., 50/60 cps, 3 phase current, has a dc magnetizing output of 1750 amp through the heads and 6000 ampere-turns through the coil. This unit, among others, will be on exhibit in the booth occupied by (*Magnaflux Corp.*)

Circle 42 on postcard for more data



## Reversing Strip Mill For Pilot Production

Stanat Mfg. Co. will show a reversing strip mill. The unit was developed to meet the demand for a high-precision reversing strip mill for use in specialty order shops and pilot production plants. The two-way strip winding mechanism comprises

both a pay-off and a recoiler which are bracketed to the mill base and driven from a pinion stand. Air clutches furnish control of front and back tension over a considerably wide range.

Circle 43 on postcard for more data



*Stanat reversing strip mill for use in pilot production plants, specialty shops*

## National Metal Show

OCTOBER  
27-31

FOR ADDITIONAL INFORMATION  
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### Leaded Steel Forgings

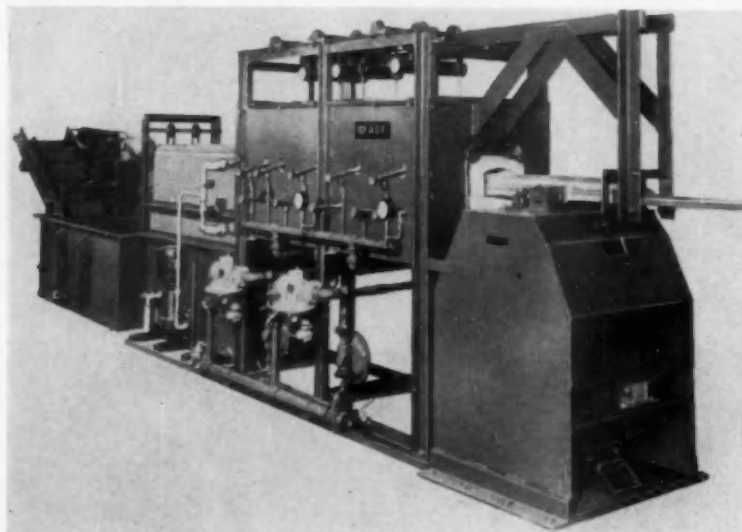
Hi-Qua-Led Steel forgings will be displayed in the ALCO booth. The forgings are available in circular seamless forged and rolled shapes from 18 to 145 in. OD and in open-die shapes to 30,000 lb.

The machining operation at the Metal Show will be on a 20 in. precision center lathe. A tachometer

reading spm will indicate the work being done on the steel. Depth of cut and type of steel will also be shown graphically. ALCO will machine 10L45 and 43L45 steel (the "L" signifies that the steel is leaded, and in this case comparable to standard grades 1045 and 4345), *ALCO Products, Inc.*

Circle 44 on postcard for more data

### Reciprocating Furnace For Bright Annealing, Hardening



To be displayed is the Model 264 reciprocating furnace designed for bright annealing and bright hardening of small stainless steel parts at temperatures up to 1900 F. The unit shown has a capacity of approximately 600 parts per hour. (*The American Gas Furnace Co.*)

Circle 45 on postcard for more data

### Machining Steels

The Ryerson exhibit will feature a line of free machining products. These will include carbon, alloy and stainless types.

Additionally, 2011-13, an aluminum bar stock and cast aluminum tooling plate will be shown.

Rounding out the display will be free machining plastic bar and plate stock, which is used for applications where corrosion resistance is a prime

factor. *Joseph T. Ryerson & Son, Inc.*

Circle 46 on postcard for more data

### Metal Heating Equipment

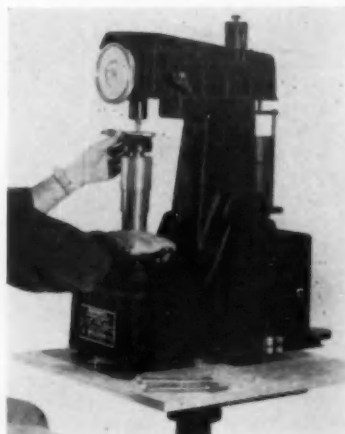
Selas Corp. will demonstrate temperature uniformity attainable with high-production, short-cycle metal heating equipment by operating a model elevator-hearth furnace at actual heat-treating temperatures. *Selas Corp. of America.*

Circle 47 on postcard for more data

### Hardness Testers

The Wilson booth will feature many of the latest techniques in the art of hardness testing of metals, including automatic Rockwell hardness testers used for nondestructive quality control checks.

The fully automatic Twin Tester



Wilson Twin Tester checks metal hardness

units are capable of conducting up to 1000 tests per hour—testing the hardness of both ferrous and non-ferrous metals and classifying the metals as too hard, too soft or correct. Manual testers average about 300 tests per hour. *Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc.*

Circle 48 on postcard for more data

### Ultrasonic Equipment

Branson Ultrasonic Corp. will use a transparent tank to show how ultrasonic energy cleans. Parts soiled with grease or insoluble contaminants will be immersed in the plastic tank. When power is applied, the soils will be removed from plastic and metal pieces without harming them.

Energy for the cleaning tank will be supplied by a 500 w Sonogen Model AP-100 ultrasonic generator, whose high-frequency electrical pulses are changed into mechanical vibrations by a transducer mounted in the tank.

Circle 49 on postcard for more data

**AUTOMOTIVE INDUSTRIES**  
**Keeps You Informed**

# NEW

## PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

### Torque-Type Lock Nuts

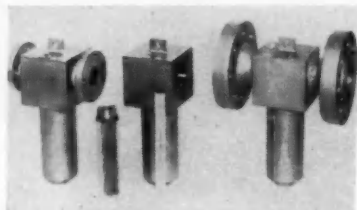
Called Lokuts, a line of one-piece hexagon washer nuts eliminate the need for a separate flat washer. The nuts are easy starting and lock any place on a screw or bolt. Hexagon-Washer Lokuts are for shock mountings, for retaining spring coils, or other applications where an object must be held in a fixed position under tension. *Shakeproof Div., Illinois Tool Works.*

Circle 60 on postcard for more data

### Line Filters

A line of heavy-duty in-line "T" filters for ground equipment will handle gases such as nitrogen, helium, oxygen and air at flow rates up to 20,000 scfm at pressures of up to 5000 psi. Designated Model 12680, the filters will also handle liquids including JP-fuel, water and hydraulic oil at flows up to 150 gpm.

The filter element is a stainless steel Poromesh sintered-wire, porous



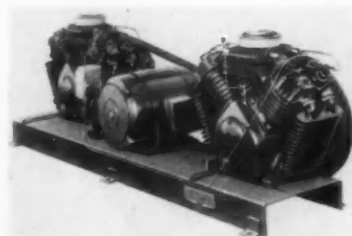
metal filter of the corrugated sleeve type which, with silver-soldered joints, will withstand temperatures up to 500 F. These elements can be cleaned and reused indefinitely. Pore sizes range from 5 to 250 microns. *Bendix Filter Div., Bendix Aviation Corp.*

Circle 61 on postcard for more data

### Double Compressor Units

New 20 and 25 hp, 125 and 175 psi air compressors have been designed

to displace from 96.4 to 129 cfm. They are equipped with a pres-



sure switch and magnetically controlled unloaders. A magnetic starter with selector switch for automatic start-stop operation or constant speed unloading is available as are vertical air receivers for remote installation. *The DeVilbiss Co.*

Circle 62 on postcard for more data

### Testing Kit

A combination yoke-coil magnetic particle testing kit, designated YL-51, has been designed to detect both transverse and longitudinal cracks in ferrous parts, and to demagnetize parts after the test has been completed. It can be used for sampling inspection, light weld inspection, in-place maintenance, and heavy equipment overhaul inspection. Operation is from 110 v, 60 cycle, 1 phase ac. The complete unit weighs 45 lb. *Magnaflux Corp.*

Circle 63 on postcard for more data

### Alloy Steel Studs

Used principally in tool and die work for machine and fixture set-up, a line of double-drawn and heat-treated steel studs has a tensile strength of over 125,000 psi. The studs are available from stock in quarter-inch multiple lengths up to 12 in. long in diameters of 1/4, 5/16, 3/8, 1/2, 5/8, 3/4 and 1 in. *Jergens Tool Specialty Co.*

Circle 64 on postcard for more data

### Noise Abatement Device

An Oilite porous bronze diffuser has been designed to be mounted on the exhaust port of air tools. The highly porous filter material breaks up the force of the escaping air by channeling it into thousands of minute passages in the material. The diffuser's controlled porosity keeps back-pressure to a minimum. *Amplex Div., Chrysler Corp.*

Circle 65 on postcard for more data

### Variable Delivery Pump

This variable delivery pump with torque limiting features was designed for emergency ram air hydraulic and



alternator drive applications. It can also be used with any air turbine drive where torque output is a function of speed. It prevents turbine stall due to pump torque requirements at start and at low air speeds.

The unit weighs 11.8 lb and is contained in a 221 cu.-in. envelope. It is for operating pressures to 3000 psi and speeds to 8000 rpm. Pump capacity at 8000 rpm and 3000 psi is 12.2 gpm. Volumetric efficiency is 95 per cent. The pump accommodates operating temperatures between -65° and 275° F with standard aircraft 5606 hydraulic fluid. *Vickers Inc.*

Circle 66 on postcard for more data



## Wire Jacketing

Zippertubing is a jacketing method which provides cabling for many applications. Made in flat form, it is easily wrapped around wire, cables,



pipelines, ducts, etc., then zipped shut with a pull tab. Either a plastic track or a metal zipper can be supplied. *The Zippertubing Co.*

Circle 67 on postcard for more data

## High Strength Steel Bar

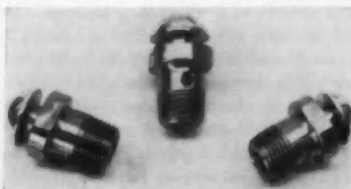
An increase in strength and tighter tolerances are features of a line of steel bars named Stressproof. The yield strength is 100,000 psi in all sizes. Standard as drawn tolerances range from 0.004 in sizes  $\frac{1}{4}$  to  $1\frac{1}{2}$  in., 0.005 in sizes over  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. and 0.006 in sizes over  $2\frac{1}{2}$  to 3 in. *La Salle Steel Co.*

Circle 68 on postcard for more data

## Poppet Bleeder Valve

The Hause V8B-2 poppet is a bleed off valve incorporating a stainless steel body, a neoprene "O" ring seal, and a chrome plated push button head. The valve was primarily designed for use as a pneumatic control circuit component but works equally well on most applications where bleed control is required.

The valve operates on gas pressures from 0 to 150 psi and has



an effective orifice area of  $\frac{3}{32}$  in. in diameter. The body is threaded to  $\frac{1}{8}$ -27 NPT. *Hause Machines, Inc.*

Circle 69 on postcard for more data

## Clutch Assembly

Shown is a spring-loaded clutch assembly incorporating a newly designed inverted type lever. A rolling fulcrum pin action in the release lever results in less friction wear and a smooth release operation. The levers automatically return to their original position after full engagement of the clutch and are balanced to avoid lever throw-out at the high speeds generated by modern engines. The clutch automatically compen-



sates for facing wear. *Rockford Clutch Div., Borg-Warner Corp.*

Circle 70 on postcard for more data

## Hydraulic Power Unit

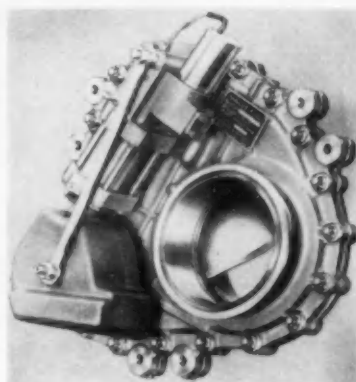
Circuitpak, a hydraulic power unit is assembled with electric motor, hydraulic (oil) pump, valves and oil reservoir. It is manifold-circuited for direct connection to cylinder lines.

Four pump capacities from 0.8 to 5 gpm are available with one, one and a half or two hp capacitor-start electric motors, and up to four solenoid-operated four-way valves. Reservoir capacity is two gal with nickel-tube heat exchanger cast in housing for cooling oil. Operation is at 3600 rpm with pressures up to 1000 psi. *Brown & Sharpe Mfg. Co.*

Circle 71 on postcard for more data

## Gate Valves

Gate valves for the handling of liquid oxygen and other cryogenics are available from Koehler Aircraft Products Co. They can be used as pre-valves or fill valves under oper-



ating conditions involving line pressures up to 60 psi and ambient temperatures ranging from  $-320$  to  $250$  F. The valves can also be used for handling of standard aircraft and missile fuels and oxidizers.

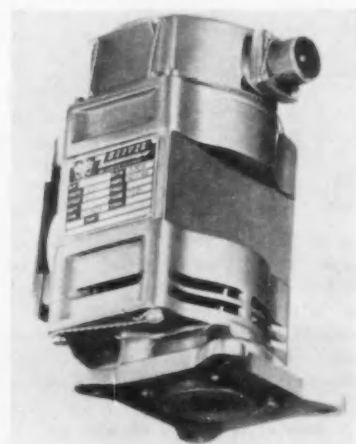
Circle 72 on postcard for more data

## Direct Current Motor

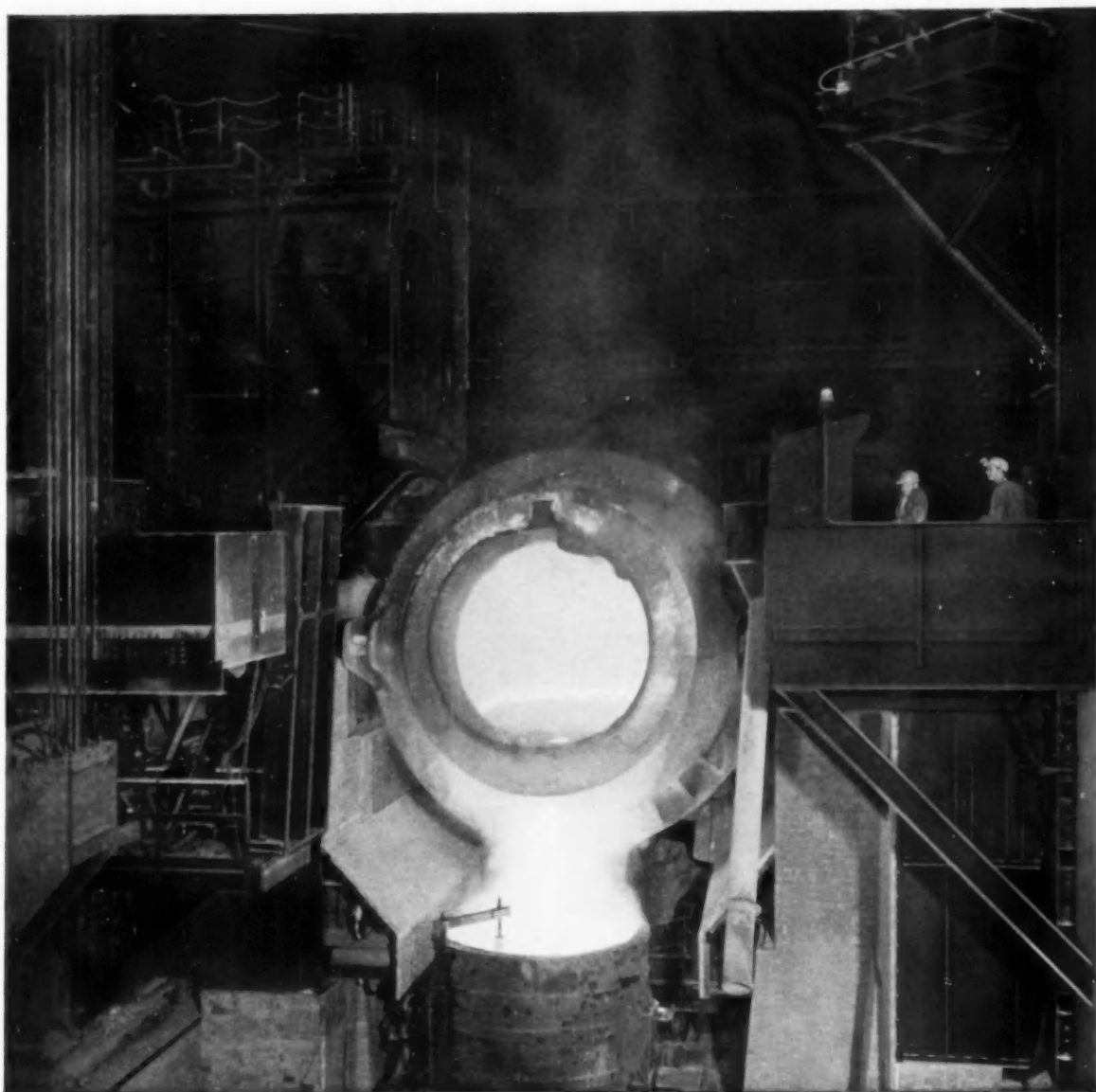
Model D-820 dc motors are designed to meet a wide range of aircraft, missile, ordnance and industrial applications. They deliver 2 hp at 3000 rpm.

The motors feature a patented brush holder whereby even brush pressure is obtained over the full wear range of the brush providing even power output and high altitude operation with a minimum of brush arcing. *Hoover Electric Co.*

Circle 73 on postcard for more data



**AUTOMOTIVE INDUSTRIES  
KEEPS YOU INFORMED**



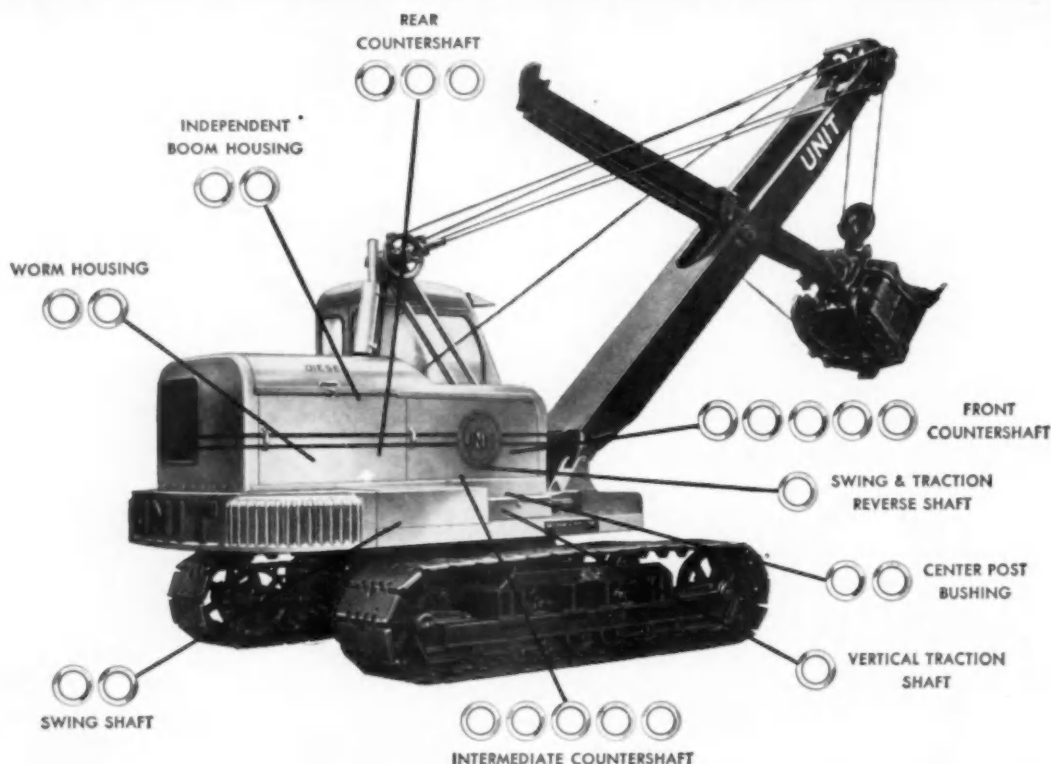
## McLOUTH DOUBLES OXYGEN STEEL CAPACITY

The vessel shown above produces 90 ton heats of Oxygen Steel. Two of these vessels—the largest producing in the world—have been added to the original Oxygen Steel making equipment and are a vital part of the expansion program at McLouth's Trenton, Michigan plant.

Ever since McLouth pioneered the first Oxygen Steel Process in the United States, we have continued to expand and improve our manufacturing facilities to bring you better steels for the product you make today . . . and the product you plan for tomorrow.

**McLOUTH STEEL CORPORATION** Detroit 17, Michigan  
Manufacturers of high quality stainless and carbon steels.

# NATIONAL OIL SEAL LOGBOOK



## National Oil Seals used at key points throughout UNIT Crane & Shovel excavators

UNIT Model 1020 pictured above is a  $\frac{3}{4}$  yard diesel excavator designed for maximum convenience and versatility in medium-duty applications. As in other UNIT excavators, National Oil Seals are installed at key points to retain lubricant, exclude dirt and water, and prolong life of bearings and assemblies.

In the UNIT 1020 Excavator, a total of 23 National Seals are employed in 9 basic subassemblies. These include front, rear and intermediate countershaft assemblies, swing traction reverse shaft, the turntable center pin assembly, vertical swing shaft, worm housing and traction shaft assemblies.

Grease seals used in the Model 1020 are of the National 50,000 series design, employing a spring-tensioned leather sealing member mounted inside a precision-made steel outer case. Shaft sizes range from  $1\frac{1}{16}$ " in the intermediate countershaft assembly to 8" on the turntable center pin. Similar use of National Seals is made in 11 other excavators offered by UNIT.

National Seals used in the UNIT Model 1020 are all of standard design; National offers over 2,500 different such seals or can design special seals for special requirements. Call your National Applications Engineer. He's listed in the Yellow Pages, under Oil Seals.

### NATIONAL SEAL

Division, Federal-Mogul-Bower Bearings, Inc.

General Offices: Redwood City, California

Plants: Van Wert, Ohio, Downey and Redwood City, California



4956



## HOW THE SILICONES MAN HELPED...

### DELIVER A HOT BLAST TO COLD JETS!

Get 'em into the air *fast*! But, complex machinery must be warmed up... and pumping high temperature, high pressure air into the jet engine melts ordinary hoses. The solution: A tough, flexible hose with two inner layers of high temperature silicone rubber bonded to an outer cover of closely woven "Dacron" fiber.

Developed by Quaker Rubber Division, H. K. Porter Company, Inc., Philadelphia, Pa., this hose utilizes UNION CARBIDE Silicone Rubber to resist temperatures from  $+450$  to  $-80$  deg. F. Weighing less than one pound per foot, it offers great flexibility for ease of handling, and is highly resistant to abrasion.

This is another example of how the UNION CARBIDE Silicones Man has helped solve an "impossible" problem. A booklet—"Look to UNION CARBIDE for Silicones"—describes silicone rubber and many other silicone products. Write Dept. JB-9701 today. Silicones Division, Union Carbide Corporation,

30 East 42nd Street, New York 17, N. Y.

The term "Union Carbide" is a registered trade-mark of UCC.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Toronto 7, Ontario

Circle 195 on Inquiry Card for more data



**SILICONES**



# News of the MACHINERY INDUSTRIES

By Charles A. Weinert

**August volume of Orders for Metal Forming-Type Machine Tools Represented a Sizable Improvement. Development of an Automatic Mechanical Forging Press Also Revealed**

## **Forming Machine Orders Show Increase in August**

**O**RDERS received during August for metal forming-type machine tools amounted to \$9.1 million net, up considerably from July's \$5.65 million and the first seven months' average of about \$6.6 million. On the other hand, net orders for metal cutting-type machine tools decreased from \$20.9 million in July to \$18.95 million in August.

Taken together, metal cutting and forming machine-tool net orders totaled \$28.05 million. July equivalent was \$26.55 million.

Latest statistics from the National Machine Tool Builder's Association also indicate that combined shipments in August amounted to \$29.45 million, versus July's \$29.7 million. In the August total, cutting-type machines accounted for \$23.1 million, while shipments of forming-type machines were valued at \$6.35 million.

## **Automated Forging Press Development Unveiled**

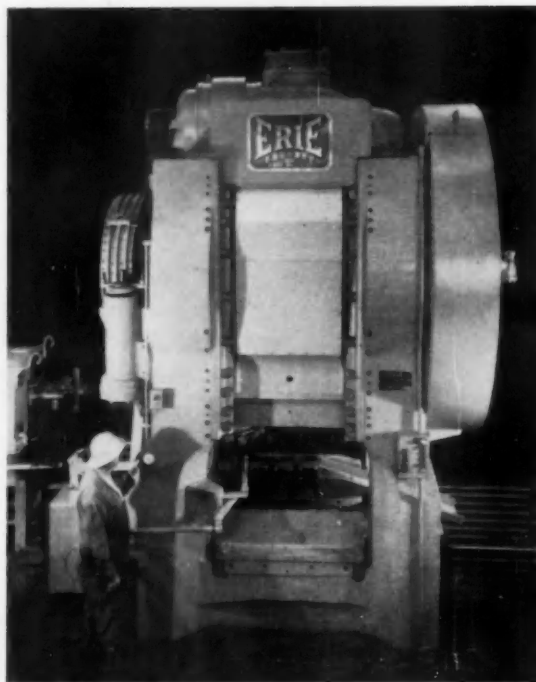
**A**T a recent press conference and demonstration, top officials of the Erie Foundry Co. revealed that the firm has come up with an automated version of its new 2500-ton mechanical forging press. This development is the second major phase of a program marking the entry of Erie into the mechanical forging press field.

The basic press was introduced late in 1957. Meanwhile, automatic transfer equipment was being designed around this latest model, culminating in the current announcement.

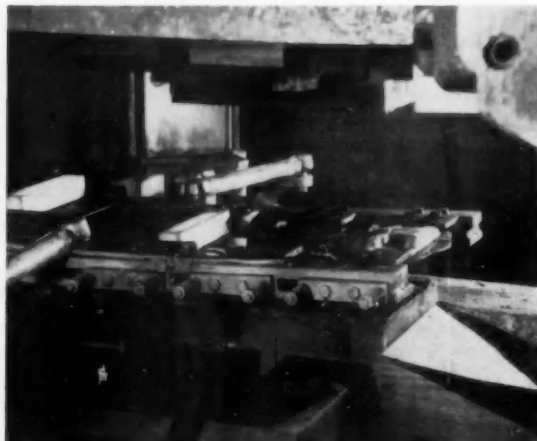
The resulting combination produces forgings at the rate of 1200 per hour—with one operator. Hot pieces, at forging temperatures of 2000 to 2400 F, are carried by the transfer mechanism successively to the two forging stations of the press and finally dropped into an outgoing chute.

The present model was designed for high-volume forging of such typical parts as engine poppet valves, pinion gears, ring gears, crawler track links, and automobile engine connecting rods. It can handle a piece up to about 10 by 10-in. square, or 12-in. diam. Other press sizes are in prospect, present thinking being in terms of capacities ranging from 1000 to 8000 tons.

(Turn to page 118, please)



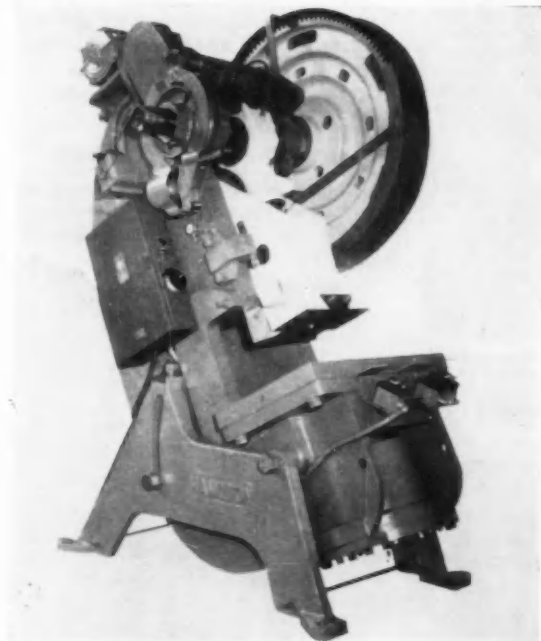
Automated model of Erie Foundry Company's 2500-ton mechanical forging press. Work moves from furnace at left, and is automatically transferred through two forging stations and to chute leading into tote box at right.



Hot bar at left is about to move into Erie forging press. Bar in center is in pick-up station, and next will be transferred to first die for semi-forging. Piece in station at right has been finish-forged, and next will be carried over to outgoing chute ready for trimming.

**NEW****PRODUCTION  
and PLANT****EQUIPMENT**

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

**75 Ton Capacity Open Back Inclinable Press**

Shown is the 75 ton open back inclinable press developed for high speed production of small stampings by Baldwin-Lima-Hamilton Corp. Features of the press include: stress-relieved fabricated steel frame which reduces deflection so that more parts can be produced before dies require re-working and an air friction disk type clutch which operates at low crankshaft speed rather than high driveshaft speed to minimize wear and heat generation. Maximum speed of operation is 40 spm in the geared version and 90 spm in the non-geared.

Circle 74 on postcard for more data

spheres, ranging in diameter from 6 to 16 in.

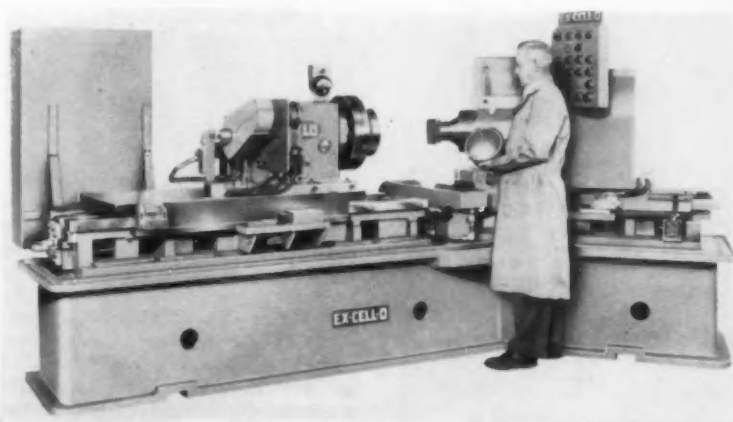
A special work spindle permits the machine to hog out material at a rate of 15 cipm at a depth of cut of 0.125 in. A tolerance of less than 0.0001 in. on hemisphere radii and approximately 0.0001 in. total on wall thickness is maintained on finish cuts. A surface finish of 10 rms, or better, is obtained. *Ex-Cell-O Corp.*

Circle 75 on postcard for more data

**DC Arc Welding Unit**

Shown is the Aircomatic Fillerarc Welder designed for consumable-electrode, gas-shielded welding processes where equal burn-off rate and wire-feed must be maintained. Current rating is 450 amp continuous. (*Air Reduction Co., Inc.*)

Circle 76 on postcard for more data



*Ex-Cell-O custom turning machine for machining ID and OD of aluminum hemispheres*

**Custom Turning Unit Machines Hemispheres to Tenths**

THIS custom turning machine performs rough and finish machining on the ID and OD of wrought or forged annealed aluminum hemi-

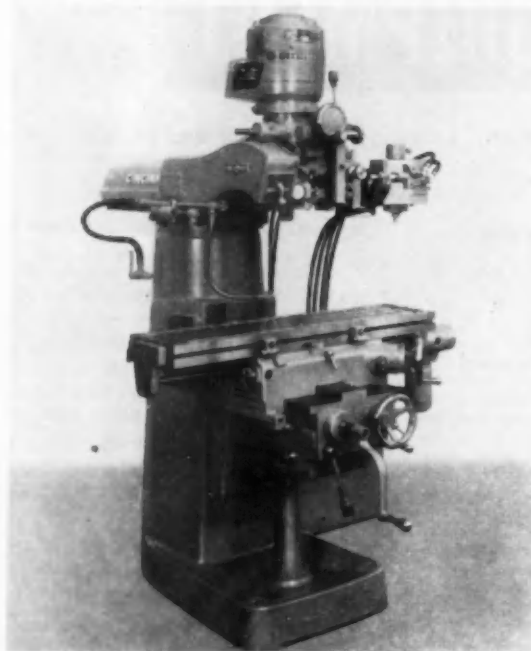
**Vacuum Coater**

A 72 in. vacuum coater with six stations which hold work pieces up to 22 by 50 in., named LCI-72, assures the operator of full capacity production loads in metallizing larger items. A complete cycle, from inserting the work pieces into the vacuum chamber to removal of the coated item, can be made with polystyrene work pieces in nine minutes. The operating range of the LCI-72 extends from 5 by  $10^{-5}$  mm Hg to 2 by  $10^{-5}$  mm Hg. *Consolidated Electrodynamics Corp.*

Circle 77 on postcard for more data

## NEW PRODUCTION and PLANT EQUIPMENT

### Milling Machine With 3D Hand Tracing Control



Shown is a Contour-master milling machine equipped for three-dimensional hand guided hydraulic tracer controlled milling. Designated 1C, the machine control unit controls the direction of traverse of the table and saddle for 360 degree horizontal profiling, and the vertical movement of the spindle quill for vertical profiling. Direction of the stylus results in a corresponding movement of the table, saddle, and spindle quill; separately or in unison. Hydraulic motors perform the actual work traversing the saddle and table units through feed screws engaging anti-friction nuts. (Cincinnati Milling Machine Co.)

Circle 78 on postcard for more data

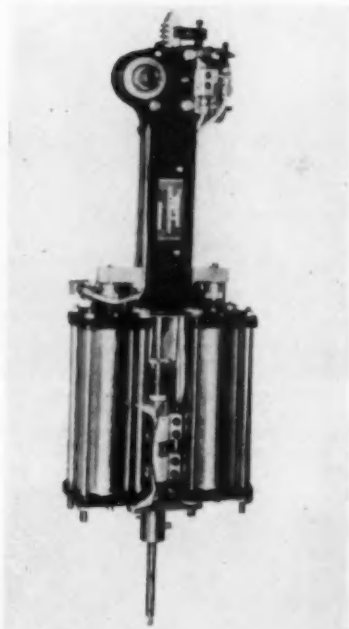
is available in lengths of 36 to 60 in., in six inch increments.

Forward and reverse direction is controlled by a butterfly switch in the control head on the steering handle. Electric switches make it impossible to direct both forward and reverse current to the drive motor at the same time. The steering handle turns 90 degrees in each direction. Brakes are automatically applied when the steering handle is in either the vertical or horizontal position, and the handle returns to vertical position when released by the operator. Clark Equipment Co.

Circle 79 on postcard for more data

### Air Feed Attachments

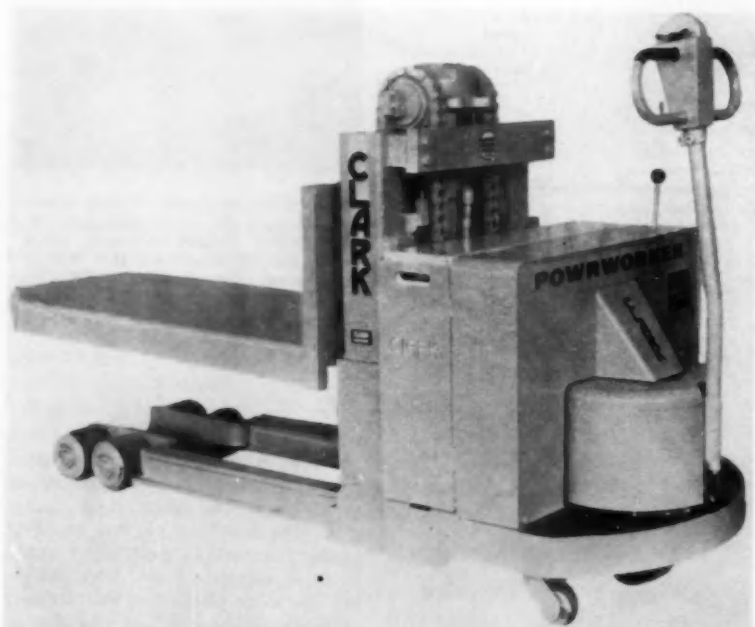
A LINE of heavy-duty drill press air feed attachments, designed especially for automatic or semi-auto-



Renco-Aire pneumatic feed attachment

matic precision control of spindle feed and retraction on standard single and multiple spindle drilling machines, has been developed by Renco-Aire Div. of Cleveland Pneumatic Industries, Inc. The compact conversion package is easily installed on any make of heavy-duty drill press, using pinion adapters to fit the machine. The attachment is engineered to handle applications requiring up to 2000 lb total drill point pressure, and will duplicate any hand pressures.

Circle 80 on postcard for more data



Clark medium-lift platform truck for lifting and hauling skids will lift 4000 lb

### Medium-Lift Battery Powered Hand Truck

THIS medium-lift platform truck has been developed for lifting and hauling skids. The standard model is

capable of lifting 4000 lb and maximum lifting height is 21 in. The skid-carrying platform is 26 in. wide and

## Hydraulic Press

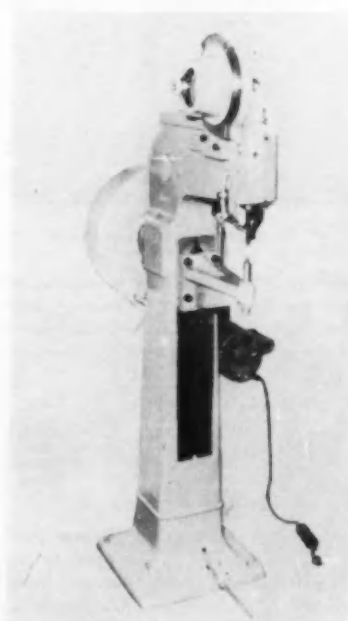
**A** LINE of compacting multipresses provides automatic, precise control of every individual phase in compacting and pelleting operations. Designed to meet the requirements of those industries compacting powdered materials, the basic unit of the press is composed of four major components: a standard multipress ranging from 5 through 75 ton floor models to 2 through 10 ton bench models, a shuttle feed unit, an individually powered and synchronized ejection ram and a control system.

Single lever control of the press permits either single or automatic cycling of the press ram. Also allows an emergency reverse position, a hold-down position for locating tooling and a neutral or idling position. *Denison Engineering Div., American Brake Shoe Co.*

Circle 81 on postcard for more data

## Rivet Setting Machine

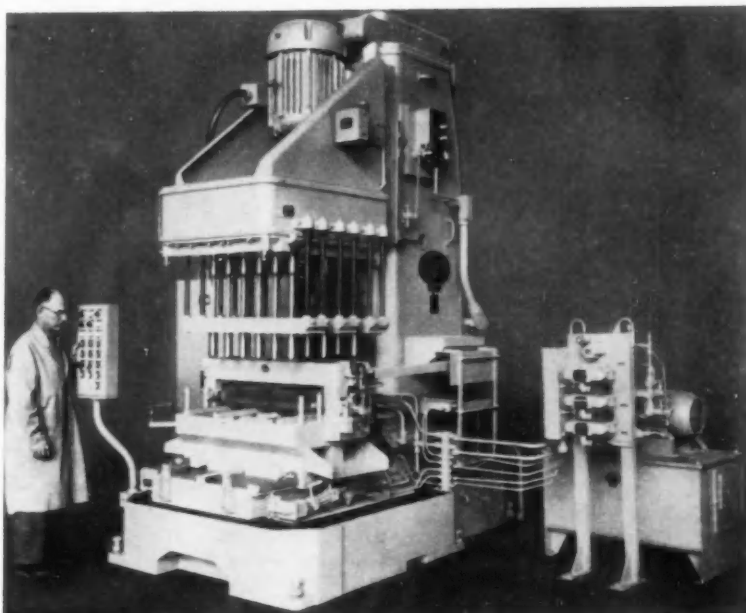
**T**HIS automatic rivet setting machine will handle all types of work. Anvils of all lengths are available making the machine adaptable to



Townsend rivet setting machine

hard-to-get-at jobs. It will handle rivet diameters ranging in size from 3/32 in. to 3/16 in. and in lengths up to one inch. *Townsend Co.*

Circle 82 on postcard for more data



Natco C4A drilling unit for machining fuel injector body holes in cylinder heads.

## Multi-Spindle Unit Machines to Close Tolerances

**F**UEL injector body holes are machined in both 4- and 6-cylinder heads by this Natco multiple spindle driller. Three sets of spindles are provided so that three operations can be accomplished automatically.

Parts are loaded directly from a conveyor, located by two master dowel pins and hydraulically clamped in the fixture. When the master cycle button is pressed the machining operations take place automatically.

Finish in the seat angle at the bottom of the hole is held to 40 micro-inches. Hole location is held to  $\pm 0.0005$  in. and hole spacing to  $\pm 0.001$  in. Natco's C4A vertical Holessteel drilling machine has a 28 by 36 in. cluster box head with 18 helical gear-driven spindles. The power unit is separate in accordance with JIC standards. *National Automatic Tool Co., Inc.*

Circle 83 on postcard for more data

## Double Horizontal Spindle Disk Grinder

Pictured is the Gardner 2H30 double horizontal spindle disk grinder which face grinds bearing cups, removing 0.025 in. of stock holding tolerances of 0.001 in. for parallelism and 0.004 in. for uniformity. (*Gardner Machine Co.*)

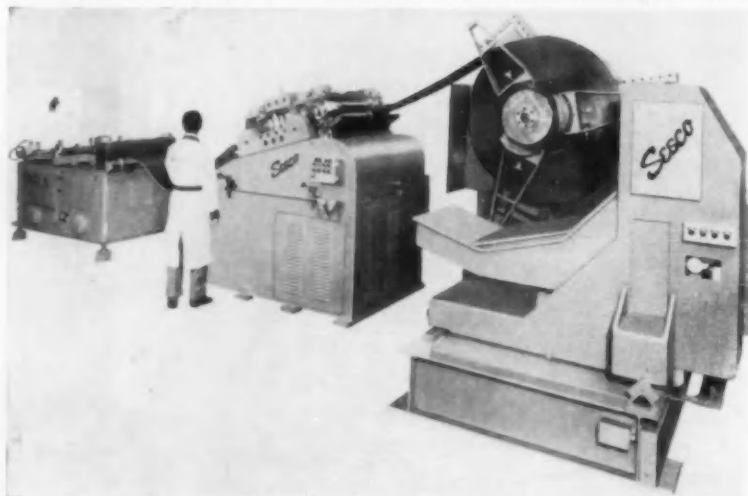
Circle 84 on postcard for more data





## NEW PRODUCTION and PLANT EQUIPMENT

### Push-Button Feed Line for Feeding High Tonnage Coils



Pictured is the SESCO "push-button" feed line for feeding high tonnage coils. The line is capable of handling coils up to 40,000 lb for direct feed into blanking, piercing, forming and progressive die operations. (Sesco, Inc.)

Circle 85 on postcard for more data

series is 10 degrees back and 6 degrees forward for safely nesting loads in transit and ease of load placement. The Yale & Towne Mfg. Co.

Circle 86 on postcard for more data

### Electro-Hydraulic Hoist

A LINE of electro-hydraulic servo-hoists designated AWB is available in four sizes having nominal capacities of  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 and 2 tons. Material can be raised up to 10 ft with any of the four models.

The entire powering mechanism is contained in the overhead trolley assembly. An electric motor drives a hydraulic gear pump which has pressure-loaded bearings for long-life operation.



Pesco Model AWB servo-hoist

eration. Fluid pressure is maintained by an accumulator, allowing from two to three lifts between each motor running cycle. Pesco Products Div., Borg-Warner Corp.

Circle 87 on postcard for more data



Yale & Towne G-5 Series 15,000 to 20,000 lb capacity lift truck especially designed for high capacity materials handling in metals manufacturing

### High Capacity, Solid Tire Gas Truck Line

THE G-5 line of high capacity, solid tire, gasoline or LP-Gas powered industrial lift trucks is built with four side thrust rollers to minimize friction due to off center loading.

The nested channel assembly of the truck uses an 11 in. wide outer section and a 9 in. wide inner section.

Weight of the load is placed directly onto a planetary drive axle. Channel rollers are located at the bottom of the moving channels and the top of the stationary channels giving the largest possible roller spacing at every height or lift.

Standard hydraulic tilt on the G-5

### Power Packages

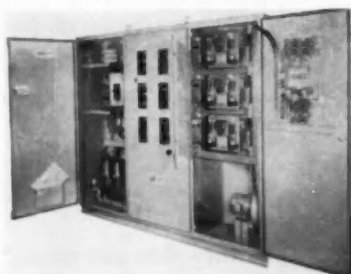
A LINE of self-contained power packages has been developed to produce hydraulic power from an electric source. The package incorporates an electric motor, hydraulic gear pump with integral relief valve, check valve and reservoir in one assembly.

Pressure loaded bearings automatically compensate for wear to assure high volumetric efficiency and longer life. Wooster Div., Borg-Warner Corp.

Circle 88 on postcard for more data

## Electronic Oven Control

A LINE of electronic power controllers for electric infra-red ovens has been developed by Weltronic Co. Variable, stepless control of power, and resulting heat, is claimed. Control is achieved through the use of electronic thyatron and ignitron tubes, and a phase-shifting control device. Absence of magnetic contac-



Weltronic electronic power controller

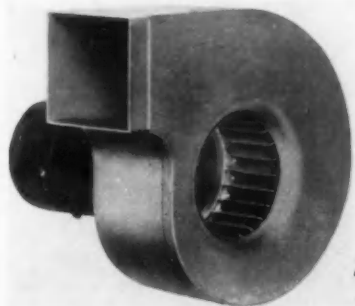
tors and all mechanically moving parts reduces maintenance problems.

Automatic features include automatic switching between pre-set, high-heat and low-heat levels when conveyors are not constantly loaded, and automatic shut-down if oven fans fail to operate or temperatures build too high.

Circle 89 on postcard for more data

## Electronic Cooling Blower

HIGH-EFFICIENCY, low pressure centrifugal blowers in a complete series from 2 to 9 in. diameters have been designed for cooling electronic equipment. The range of air delivery is from 20 to 2000 cfm, depending upon the impeller size and motor



Torrington centrifugal blower

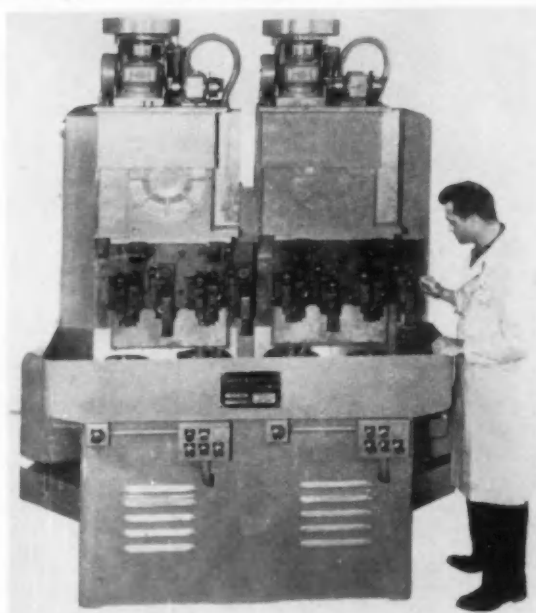
speed. Input power is provided by either ac, dc or 400 cycle aircraft motors. Total weight of the unit is less than two pounds. The Torrington Mfg. Co.

Circle 90 on postcard for more data

## Precision Boring, Turning and Facing Machine

Principal component of these machines, which perform precision boring, turning and facing operations, is a ductile cast iron head supporting a vertical slide and cross slide. These tool slides are actuated by a pair of cams mounted on a common shaft which is itself carried with the vertical slide. The base on which the head rests is of cast construction and serves as a housing for carriage type spindles. The BV machine is capable of heavy cuts on castings and forgings as well as precision cuts of less than 0.0005 in. on finishing operations. (Hoern & Dilts Div., The New Britain Machine Co.)

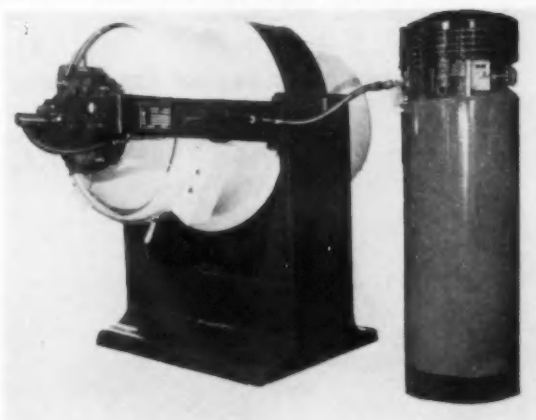
Circle 91 on postcard for more data



## Low Temperature Tumbler for Deburring Silicone Rubber

This machine is designed for removing the burr from high temperature rubber. The silicone rubber parts are automatically frozen through the use of liquid nitrogen and tumbled in the barrel of this machine. Capacity is 200 lb and the unit is standardized with a 16-in. quick-opening door. A quick dumping feature is designed to save time during high quantity finishing of small and medium size parts. (Ryan Industries)

Circle 92 on postcard for more data



## Drive Line Components

HYDRA-DRIVE Torque Converters were developed to meet special needs in earth moving, construction and materials handling equipment. The unit provides the equivalent of a gear transmission with many ratios which automatically selects the right ratio to utilize the maximum power efficiency.

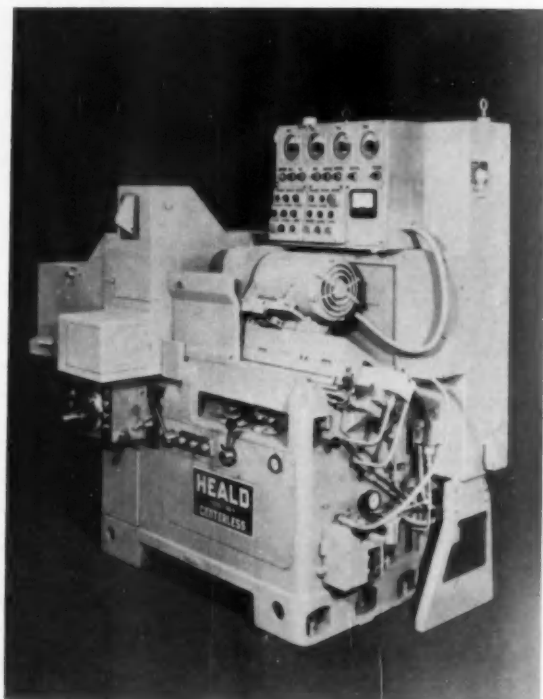
The transmissions are designed for use in heavy-duty equipment used in

off-the-highway work where multi-speed operation is required such as road graders, front end loaders, and military vehicles.

Unit consists of a torque converter and a power shift transmission in one integral housing. With four speeds forward and reverse, the unit is suited for vehicles that must travel in different directions during a normal work cycle. Rockwell-Standard Corp.

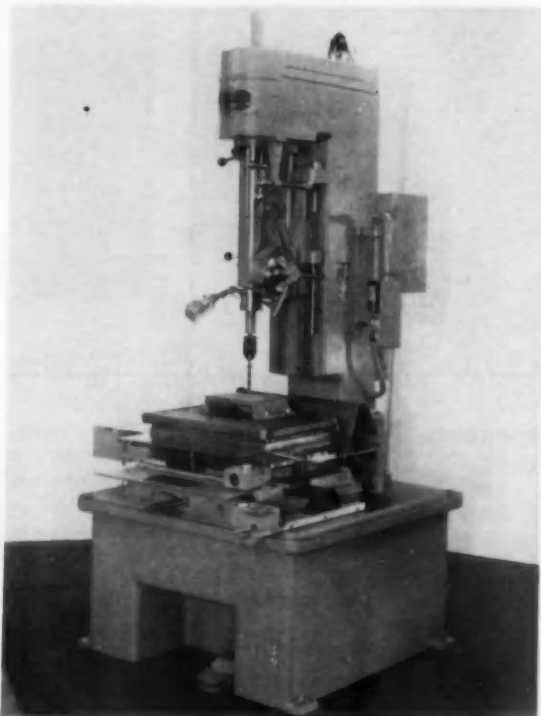
Circle 93 on postcard for more data

## Roll-Type Centerless Unit for Small, Medium Size Work



Model 180A roll-type centerless machine is designed for small to medium sized work that can be rotated on its own OD. Work with  $\frac{3}{4}$  to  $4\frac{1}{2}$  in OD can be handled, and holes up to 3 in. long can be ground. Maximum included angle of taper on Size-Matic type is 60 degrees. Base on floor is 50 in. long and 30 in. wide, and the unit requires 80 by 80 in. of floor space. The table of this internal grinder is inclined at an angle of 30 degrees to the work. (The Heald Machine Co.)  
Circle 94 on postcard for more data

## Machine Performs Layout Operations Economically



The Edlund No. 2 Layout Machine performs such layout operations as center drilling, drilling and reaming in parts which do not require jig boring tolerances, such as drill jig bushing plates and templates. The machine can be supplied with simple hand-operated screw type tables, or semi-automatic tables using gage blocks or spacer bars, as well as those tables automatically programmed by tape or card. Rated capacity is one inch in cast iron,  $\frac{7}{8}$  in. in mild steel. Spindle speeds with a 900 rpm motor are variable from 340 to 2700 rpm in direct drive and 85 to 675 rpm in back gear drive. (Edlund Machinery Co.)  
Circle 95 on postcard for more data

## Low Alloy Iron Powder

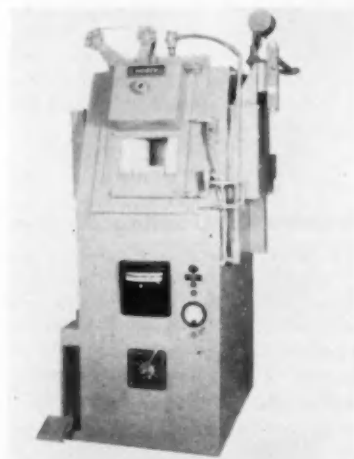
REPUBLIC Steel Corp. has developed a high strength, low alloy iron powder. The powder, designated Type 6460 incorporates small quantities of nickel and molybdenum as alloys. Type 6460 may be fabricated to develop minimum tensile strengths of 60,000 psi as sintered and 100,000 psi when heat treated.

Fabrication of parts from Type 6460 permits normal briquetting pressures, normal sintering cycles and normal heat treating procedures. The dimensional characteristics after sintering fall within the commonly accepted tolerances of the powdered metal industry.

Circle 96 on postcard for more data

## Atmosphere Box Furnace

THIS high temperature atmosphere box furnace is designed for heavy and continuous duty at all heat levels up to 2500 F and for short or intermittent runs to 2700 F. Heating ele-



Lindberg Type G8-50 box furnace

ments are of the non-metallic silicone carbide type. Working area is 6 in. wide by 12 in. deep by 5 in. high. Lindberg Engineering Co.

Circle 97 on postcard for more data

## Missile Chuck

HORTON Chuck Div. of the United Greenfield Corp. has developed a 12 jaw universal pinch type chuck for holding large diameter missile parts. The chuck is 46 in. in diameter and can be used singularly on vertical lathes, or in pairs on horizontal lathes for parts, sub assemblies and complete missile tank assemblies.

Circle 98 on postcard for more data

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# The BUSINESS PULSE

*Business Uptrend on Solid Basis and Now Has Substantial Forward Thrust. Stimulating Effects of Federal Cash Budget, Inventory Liquidation Slowdown and Home Building Uptrend Still in Evidence.*

The uptrend in business still seems to be gathering strength. It now appears to have good promise of continuing for an extended period.

At this writing, figures on gross national product for the third quarter have not been officially released. Apparently the rise for the period was very substantial, amounting to something like \$10 billion at an annual rate.

Moreover, indications are that the gain was broadly diversified as to origin, reflecting higher consumer outlays, higher construction expenditures, a slower rate of inventory liquidation, and a further advance in spending by all types of governmental units. Capital spending by business may have moved counter to the trend, but any decline here was apparently of moderate proportions, much less than in previous quarters.

The index of industrial production also conveys the impression of rapid recovery. It has come a substantial distance in a relatively short time, having retraced since April half the setback suffered in the recession.

## Substantial Forward Thrust

The fact that the recovery movement has attained a good deal of forward thrust is in itself one of the main reasons for viewing the future with optimism. Upturns, once they are solidly under way, tend to feed upon themselves and to be self-sustaining. Expansion in one sector, accompanied as it is by a larger flow of payments, produces expansion elsewhere. This

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This Survey, published for the readers of automotive magazines exclusively in **AUTOMOTIVE INDUSTRIES**, has been prepared by the Guaranty Trust Company of New York

---

secondary wave of expansion, moreover, gives rise to a third wave, the third to a fourth, and so on, the natural tendency being for the economy to move toward a condition of more or less full employment of resources before the process stops. This has been the typical pattern in the history of business cycles.

In addition to the factor of momentum, there are more specific reasons for anticipating that present recovery will be extended. Most important is the fact that those forces which appear to have been primarily responsible for the emergence of the uptrend still seem far from being exhausted.

The first thing to be noted in this regard is that the stimulating effects of the Federal cash budget are still very much in evidence. The sharp decline in receipts and the sharp rise in outlays, which occurred in the first half of this year, exerted an important buttressing influence at the time when recessionary influences were strongest, and the prospective cash deficit of \$13.5 billion for the current fiscal year means that this stimulus is still working. At the same time, there is every indication that expenditures by state and local governments will continue their well-defined uptrend.

## Inventory Trends

It also appears likely that the bolstering effect which has been provided by changes in inventory trends will persist for some time. The peak rate of liquidation was probably experienced toward the end of the first quarter of the year, and since then the slowdown in the pace of liquidation has been a key buttressing force in the economy. All present indications are that the rate of liquidation is continuing to lessen, which means that this stimulus, too, is continuing to work. Moreover, historically the normal tendency has been for businessmen to move into an area of net addition to business stocks as the economy ascends the recovery curve. Thus, with sales and new orders now on the rise and with accompanying improvement in the inventory ratios, there are good prospects that changes in inventory policy will continue to be a factor making for expansion for some time to come.

The uptrend in home building also continues to exhibit considerable vitality. Starts are running some 25 per cent above their recession low early in the year, and the latest foreshadowing data portend continued large volume over the remainder of the year. The sharp advance which has lately occurred in interest rates in capital markets has produced some fear that the flow of funds going into mortgages may dwindle. To judge from past experience, there would seem a definite possibility that the availability of mortgage money may be adversely affected. How-

*(Turn to page 114, please)*

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Equipment Offers these  
Important Advantages:**

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# AIR BRIEFS



By David A. Partridge

## Long Future for Gas Turbine Engine

The engine that powered the Wright Brothers' aircraft produced 12 hp and weighed 179 lb, a weight-to-power ratio of 16 to 1. A modern piston engine in volume production today produces 3500 hp with a weight-to-power ratio of less than 1 to 1. Modern jet engines deliver the equivalent of six horsepower for every pound of weight; and one rocket missile engine now in use produces enough power to propel a Navy cruiser.

In a little more than 50 years the U. S. aircraft engine industry produced over 1,000,000 piston engines and, in 10 years, about 90,000 gas turbine engines.

Future advances in aircraft powerplants, engines capable of taking man to outer space, will be considered incredible even by today's high standards. However, before these developments come to pass, industry leaders predict that the gas turbine principle will dominate the aircraft field at least as long as the piston engine—a span of more than 50 years.

## Personal Plane Shipments

Nine U. S. personal plane makers, during 1957, shipped 6118 one-to-ten place utility and executive aircraft, according to Joseph T. Geuting, Jr., Manager of the Utility Airplane Council, Aircraft Industries Association of America.

Value of the shipments, he said, was \$99,652,000 figured at the manufacturers' net billing prices.

## Air Force Gets \$17.9 Billion

The Air Force received \$17.9 billion for Fy 59, \$225 million more than the President sought from the 85th Congress. The bill

provides approximately \$6.6 billion for USAF aircraft and related procurement, and \$743 million for research and development. Operation and maintenance of Air Force equipment is budgeted at about \$4 billion.

## Brief Air Briefs

North American X-15 high-altitude, high-speed research aircraft should be completed this month. . . . Navy is hoping to develop underwater ejection system for pilots of downed aircraft. Project being investigated by the Naval Air Development Center, Johnsville, Pa. . . . George P. Sutton of Rocketdyne and president of the American Rocket Society sees space flight as a \$4 billion dollar industry, employing 400,000 to 500,000 people within the next 15 years. . . . Static test of Thiokol Chemical Corp.'s solid propellant missile termed "completely successful" by Army. . . . Last month saw the first flight of North American's Saberliner, at Palmdale, Calif. . . . Army has terminated development of the Dart Anti-Tank missile for other anti-tank systems with greater kill probability. . . . One of the larger jet transports now undergoing certification will have 19 times the work capability of the "workhorse of the air," the DC-3.

## Aircraft Industry Reducing Costs

Although not common knowledge, Mr. U. S. Taxpayer has been experiencing dividends from active cost reduction efforts of the Aircraft Industry. Efforts in this direction include manufacturing methods which continually provide lower cost benefits: for example, numerical control of machine tools.

One analysis showed a reduction of more than 50 per cent in the cost of milling aircraft wing skins through use of this method.

Another example involves a tool insert which is used up by the thousands. A new grinding technique permits 60 per cent of the used bits to be re-used, and 30 per cent of them can be re-sharpened for less than the cost of a single new one.

## Aircraft Employment

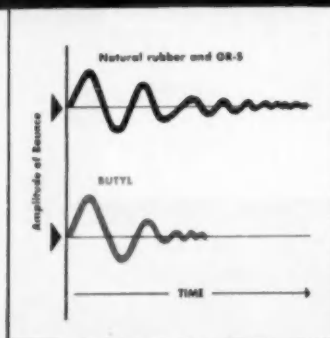
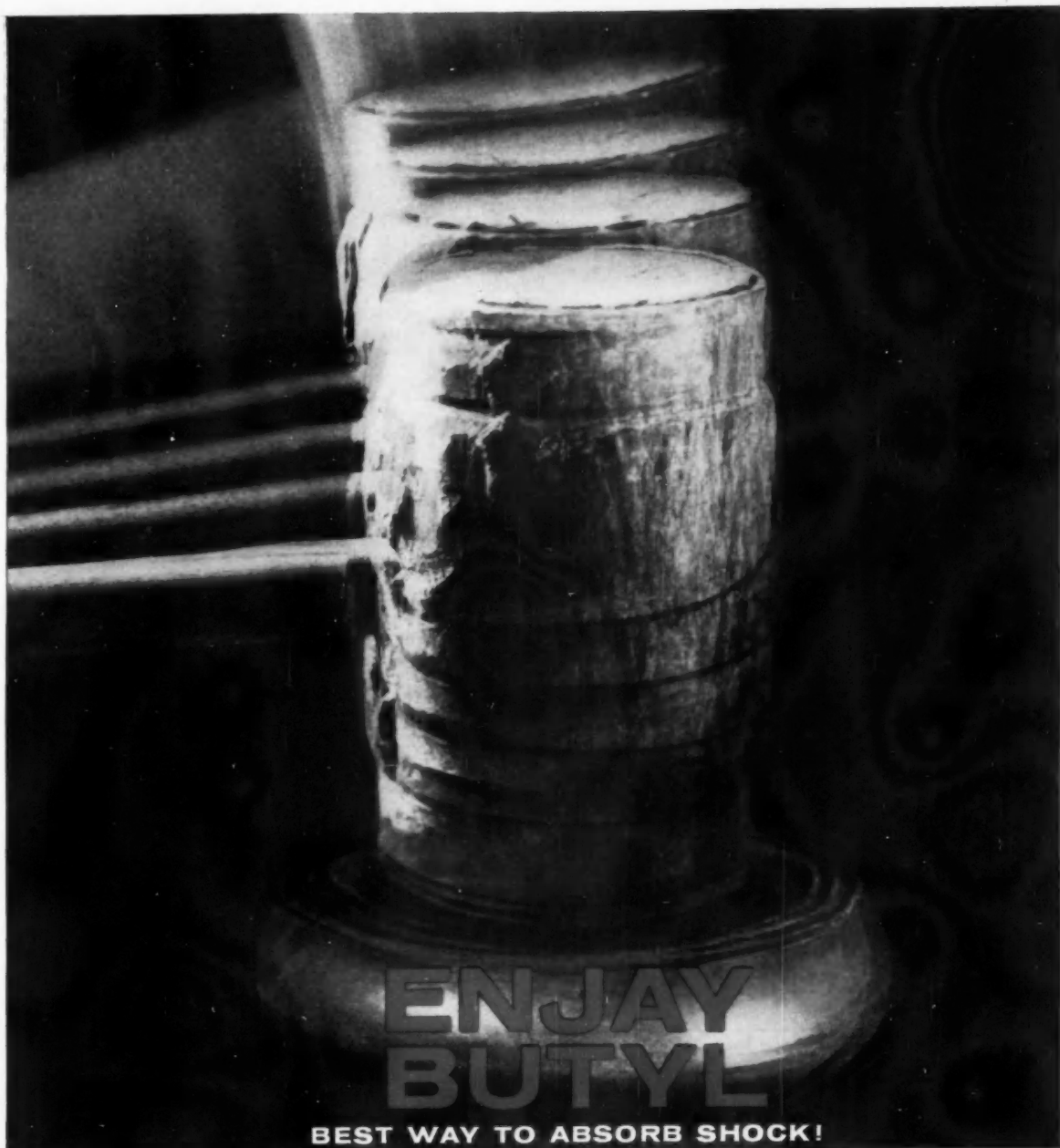
Employment in the aircraft and parts industry dropped from 754,200 in April to 740,700 in May, 1958, according to the most recent report of the Bureau of Labor Statistics. Employment in the industry dropped a total of 168,400 workers from the high of 909,100 workers reported for April, 1957.

The effects of new orders for aircraft and missiles placed during the past few months are only now being reflected because of the lead time required for these complex weapons systems.

Although employment dropped, average hourly wages in the aircraft and parts industry showed the largest gain in 1958 during May, rising to \$2.49 from \$2.44 in April. The 2.1 per cent increase reported places aircraft industry wages exactly \$1.00 an hour above the average hourly wage paid in 1948.

## Utility Exports Decline

During the first six months of 1958 utility aircraft exports numbered 495 planes valued at \$7,010,300. This figure, as reported by five leading makers, is a 26 per cent decrease from the 665 utility planes valued at \$10,089,000 shipped in the same 1957 period. ■



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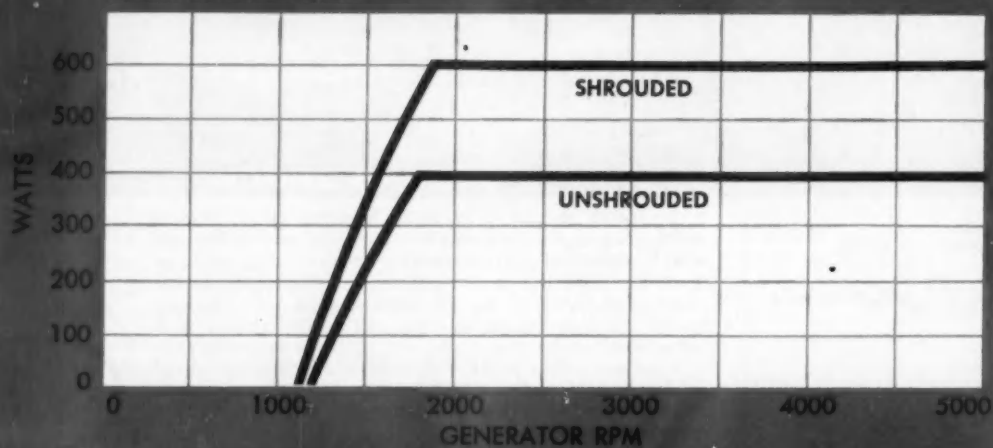
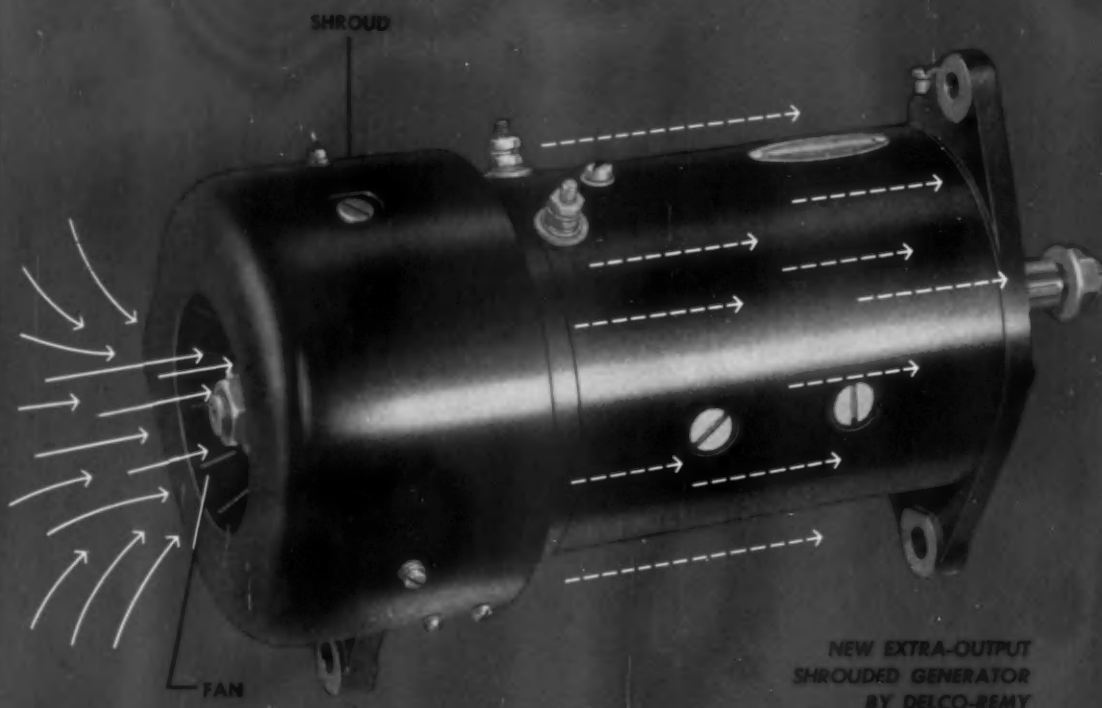
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WITHOUT INCREASE IN SIZE**

Delco-Remy's new, totally enclosed shrouded generators offer up to 50% more output than former enclosed models of this size. They are especially designed for construction vehicles and off-the-road equipment subject to extremes of dust and moisture, or corrosive materials. Because they are totally enclosed, they are *splash-proof* and *dust-proof*.

Key feature of the new units is a high-efficiency fan mounted at the commutator end in a compact, formed steel shroud. The shroud-controlled air blast travels closely along the generator frame where it produces rapid and effective cooling . . . makes possible up to 50% more output, without the added cost of increased frame size.

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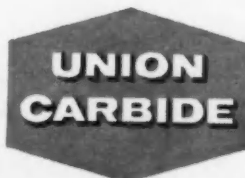


Sigma welding, with LINDE Apparatus and LINDE Argon, makes possible high-speed production welding of aluminum and other commercial metals, manually or automatically.



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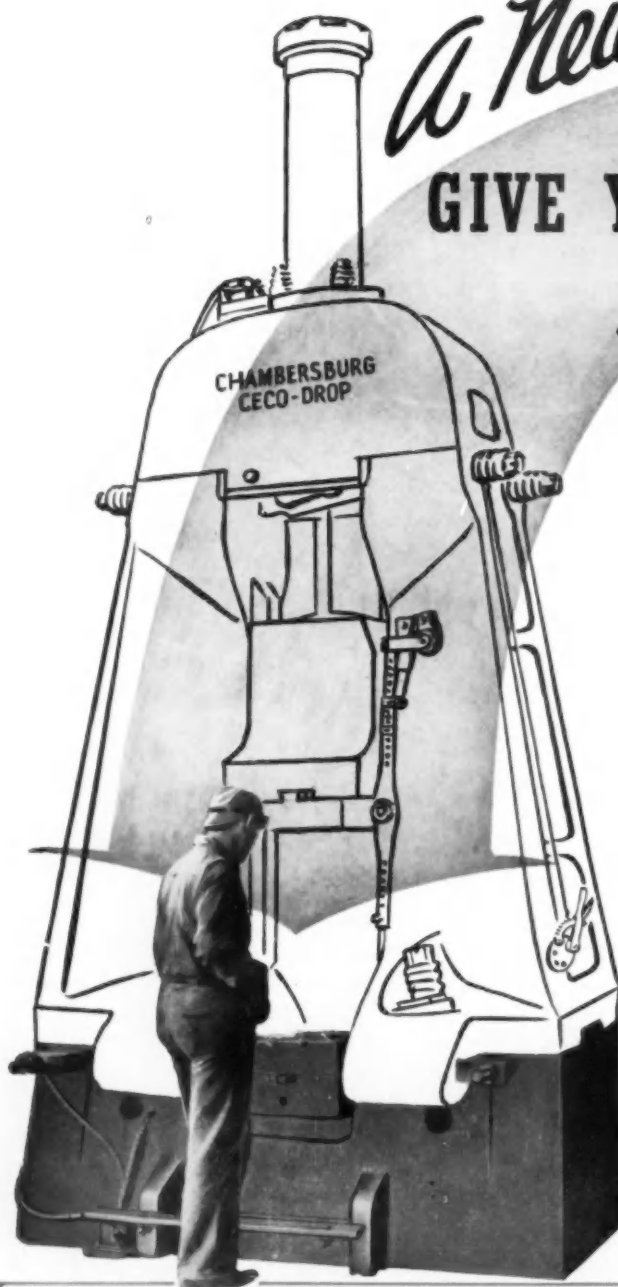


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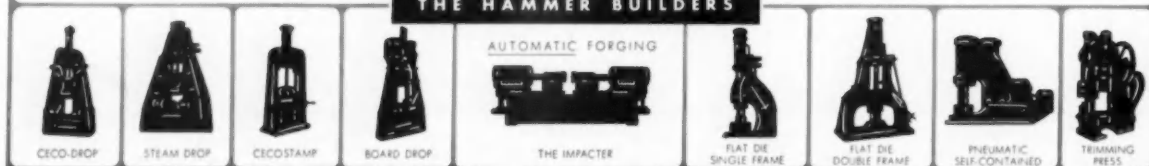
Here's a good suggestion: You can install Ceco-Drop upperworks on your existing board drop hammer anvils. Thus at a considerable saving you will be in a position to meet and beat tomorrow's stiff competition. You will produce more accurate forgings at a lower cost through more continuous production. You will have the most modern forging hammers available. Your hammermen will end their shifts fresh and still full of pep.

That's part of the Ceco-Drop story. The rest is in Bulletin 80-L-7 a copy of which will be sent on request. Write today.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

# CHAMBERSBURG

THE HAMMER BUILDERS



## New Line of Ford Passenger Cars

(Continued from page 55)

well as for the extension, combined with the reduction in the number of parts has resulted in a weight decrease of some 22.8 per cent.

The 1959 Ford-O-Matic operates by means of a hydraulic torque converter combined with an automatic planetary gear train. The gear train has two band clutches—the front for low, and the rear for reverse; two servos for operating the front and rear bands; and a multiple disk clutch assembly for direct drive.

The gear ratios for this transmission are as follows: Low 1.75 to 1; Drive 1 to 1; and Reverse 1.5 to 1.

In drive position the transmission shifts 1-2 at 16-18 mph at minimum throttle. The full acceleration 1-2 shift occurs between 45 and 65 depending on the rear axle ratio and tire size. The transmission will down shift on demand at speeds between 50 and 55 mph. The (2-1) coasting down shift takes place between 6 and 13 mph.

The transmission may be shifted at any speed manually from 2 to 1 by placing the selector lever in low; however, because of the 1.75:1 gear ratio in low this is not recommended at extremely high speeds. By shifting the transmission manually to low the transmission acts as an effective down hill brake.

A foot-operated parking brake has been introduced, with the control located at the left side of the steering column. It has a tip-down handle for brake release, located on the left under side of the dash. The foot pedal has 6½-in. travel with 3.25 to 1 ratio. The pedal arm actuates a cable to midship-mounted lever and the lever, in turn, operates two cables, one to each rear wheel. Overall ratio at the rear wheels is 25.11 to 1.

The Fresh Air Heater is completely new, designed to mix hot and cold air by mechanical dampers instead of modulating the temperature of the water in the heater core. Fresh air from the intake duct passes through the fan blower chamber where it is directed, de-

pending upon the position of a mechanical damper, either through the heater core, around the core, or partially through the core. This air is then mixed and distributed through the heater and defroster vents.

Its unique advantage is the instantaneous temperature response to the changing of the heater control lever after the engine has been warmed up.

The so-called Limited Slip differential, offered as optional equipment, now is Ford-designed and will be manufactured at the Ford Sterling plant. In this design the differential is locked at all times until slipping action is required. Secret of the device lies in the use of a constantly pre-loaded clutch, set to slip at torque values between 315 and 385 lb ft.

The clutch consists of two friction-coated steel plates sandwiched between three steel plates. The outside plates apply pressure against the friction plates by means of a spring washer between the plates and the differential case. Since this differential is completely interchangeable with the standard differential, essentially the same rear axle can be used in all Ford cars.

## Chevrolets for '59

(Continued from page 59)

mission includes a manually controlled reverse gear lockout for 1959.

The Chevrolet El Camino combines passenger car styling with truck utility. Designed as a dual-purpose vehicle, El Camino is capable of hauling light or bulky loads up to 1250 lb in its 32½ cu ft box.

Three power trains are available with El Camino: a six-cylinder engine and three-speed manual transmission are standard, with a choice of overdrive and Powerglide automatic transmissions; and 185 and 230 hp V8 engines with a choice of three-speed manual, overdrive, Powerglide or Turboglide transmissions.



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Southern fasteners can bring speedier assembly, less down-time and less materials loss to your profit picture. Southern manufactures only profit-producing fasteners, using only USA materials and manpower. May we hear of your requirements, in order that we may tell you how Southern's price, quality and service can perk up your profit picture. Address: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina

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New York • Chicago  
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## Use of Plastics

(Continued from page 52)

mation of the molding process. Although automation methods pay off where large numbers are involved, the authors believe that some of the Ford methods could be profitably applied to short-run operation as well.

The authors describe the molding of two parts—the distributor housing and water pump impeller. The

basic features of the semi-automatic molding technique were listed as follows:

1. Raw material handling.
  - a. Handling in 70-cu ft. rubber sealed bin containers.
  - b. Volumetric metering of desired changes in formulation.
  - c. High-frequency preheating of loose powder.
  - d. Automatic loading of preheated loose powder into mold cavities.
2. Semi-automatic insert loading.

3. Semi-automatic molding cycle.
4. Automatic part removal from molds.

Still another case study of successful applications of epoxy resins for plastic tooling and manufacturing equipment details was provided by William Ervin, Delco-Remy Division. The usual formulation at Delco-Remy is an epoxy resin loaded with varying proportions of aluminum powder, silicate, or carbide powders.

Among the parts produced here are: Commutator bar header box on which they save about 26 hours of tool room time per day, compared with the making of steel boxes; gears—used in the train of a coil winder. This gear has a surface coating of quartz-filled epoxy with an aluminum-filled epoxy poured behind it. Plastic gears cost about \$2 apiece, compared with \$9 apiece for the cheapest steel gear.

Winder pins of plastic require a five-piece mold and have a labor content of about 45-minutes, compared with a tool room cost of 10 hours per steel pin.

Cams have been exclusively in the province of metal parts. Now the cam blanks and hubs are made of plastic, the cam section being blank since it requires only a single lobe and can be readily cut to form. The cost of making these parts in plastic is only one hour, compared with eight hours when formerly made of aluminum. Another type of cam, formerly made of steel, is made of epoxy at a cost of but 30 minutes of labor, compared with 10 hours when machined from steel. In this instance the wear surface is coated with a wear-resistant material, then the mold is poured with aluminum-filled material.

A variety of fixtures for automatic assembly machines also are made of epoxy resin parts, partially laminated in some cases. Major reason for the shift from steel is that the steel fixtures frequently damaged the product.

Some impression of the growth of the plastics industry and the interest in this subject may be gained from the fact that this Conference drew an attendance of some 300 SPE members and guests. Such attendance is even more impressive when you consider that this was strictly a regional meeting. ■

Wherever 2-way shut-off is required...

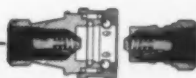
HERE'S THE COUPLING FOR THE JOB



# HANSEN

SERIES HK®

**TWO-WAY  
SHUT-OFF  
COUPLING**



Shuts off both sides of line...  
prevents loss of liquid, gas or pressure



WRITE FOR THE  
HANSEN CATALOG

Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings—including Special Service Couplings for L. P. Gas, Steam, Oxygen, Acetylene, etc.

To connect a Hansen Two-Way Shut-Off Coupling, you merely pull back the sleeve and push the Plug into the Socket. To disconnect, just pull back the sleeve. No tools required. When Coupling is disconnected, similar valves in Socket and Plug shut off both ends of line—practically eliminate spilling of liquid or escape of gas at instant of disconnection.

Hansen Series HK Two-Way Shut-Off Couplings are available with female pipe thread connections from 1/8" to 1" inclusive. Available in brass or steel.

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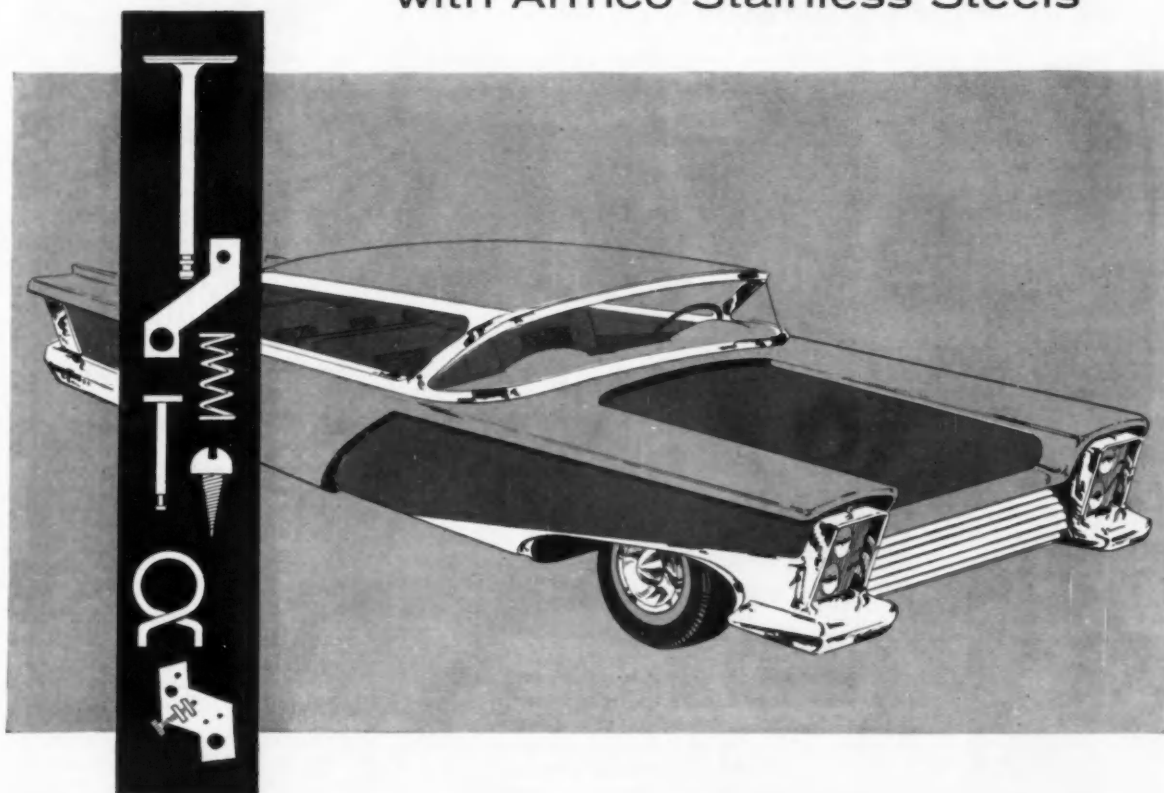
MANUFACTURING COMPANY

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# Design

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with Armco Stainless Steels



Armco Stainless Steels lend dash and beauty to corrosion-resisting automotive trim, give strength and durability to hard-working mechanical parts.

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For stainless *now*, call the Armco Sales Office nearest you. If you're considering stainless steel for a new application, fill in and mail the coupon.

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## ARMCO STEEL

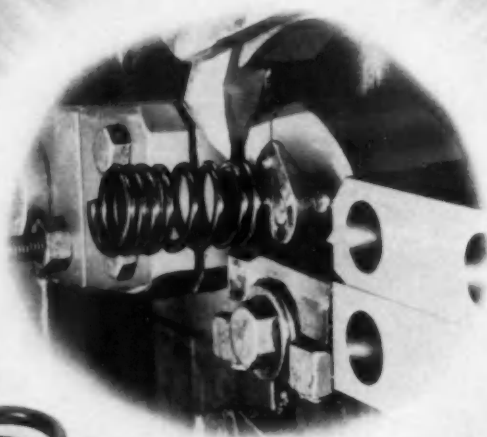


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at Automatic is another outstanding example of the various precision operations that produce perfect springs for your product. Modern, high speed coilers in a complete range of sizes are arranged for continuous flow production. Every operator is equipped and trained to maintain uniformity and high quality.

During coiling alone, Automatic springs receive these seven quality-control tests.

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7. Tests for uniformity.



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# AUTOMATIC

SPRING COILING CO.

4048 West Thorndale Ave., Chicago 30, Ill.

Circle 205 on Inquiry Card for more data



Petroleum fuels make up 40 per cent of the weight of a fully loaded jet airliner.

Outside of the military, the use of helicopters for offshore oil and gas development comprises the biggest whirlybird operation in the world.

Petroleum chemicals, the wonderchildren of the oil industry, will need \$850 million to "grow" on this year. This amount represents the money needed for petrochemical expansion.

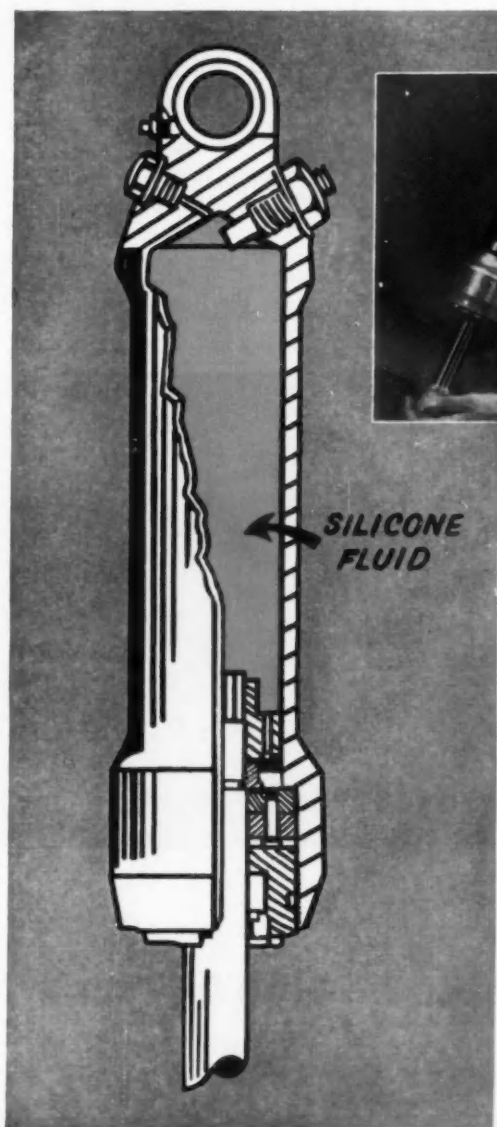
More than 15 per cent of total stainless steel production was used by automobile and truck manufacturers, and 30 per cent of other alloys.

Automobile and truck manufacturers used 64.8 per cent of natural rubber and 61 per cent of synthetic rubber production in this country, 42 per cent of lead, 28 per cent of zinc, 13.6 per cent of nickel, and 7 per cent of copper output.

In 1957, motor vehicle users paid about \$8.2 billion in special automotive taxes, \$2.2 billion of which was levied on truck users. This compared with a total of \$7.9 billion in 1956 and \$3 billion in 1947.

The wholesale value of 1957 motor vehicle sales totaled about \$13,575,000,000, up nearly \$2 billion from the previous year.

The wholesale value of automotive replacement parts and accessories sold in the domestic market in 1957 amounted to about \$1,850,000,000, up \$23 million from 1956.

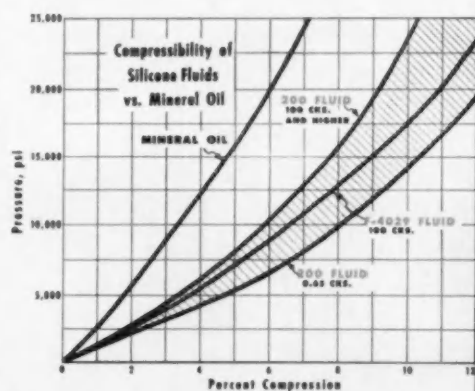


#### NEW SHOCK ABSORBER DESIGNED TO TAKE PRESSURES UP TO 50,000 PSI

This aircraft shock absorber is based on a liquid spring principle — a principle that can be adapted to a wide variety of mechanical applications. A product of Cleveland Pneumatic Tool, the new type shock absorber employs a piston moving in a cylinder completely filled with Dow Corning silicone fluid. By using this fluid, Cleveland Pneumatic was able to design to smaller size, and to incorporate such advantages as controlled spring action and rebound, and reduced weight over more familiar air-oil struts.

## How to design for high performance with SILICONE FLUIDS

Dow Corning silicone fluids offer you a number of design advantages over petroleum-base oils. Silicone fluids are more indifferent to temperature variations, more resistant to oxidation and more compressible at very high pressures. They are highly resistant to breakdown under shear. Thus, Dow Corning fluids enable you to design more uniform performance and dependability into such devices as liquid springs, torque converters, damping units, hydraulic mechanisms and other mechanical accessories having a fluid component. For properties and performance data, talk with the technical representatives in our branch offices or write to Dept. 0610.



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## Missile Programs Analyzed at ARS Detroit Meeting

(Continued from page 62)

quid oxygen and ethyl alcohol. Ballistic shell manufacturing and final assembly of Redstone and Jupiter were described by John S. Sheldon, Chrysler Missile Div. Many new welding problems were encountered at the start of the Jupiter program because of the high-strength aluminum alloys specified for the ballistic shell. To meet this problem the electrical laboratory developed an electronic recorder to chart exact values of travel, wire-feed speed, welding voltage, welding current, and line voltage. Thus it establishes exact values that are transferable to other production welding equipment. Another problem was the need for requalifying all welding operators to a new Government specification having more stringent requirements.

Every linear inch of welding on the Jupiter is subjected to radiographic examination. The Jupiter structure is broken down into four main sections—tail assembly, center section assembly, aft section assembly, and nose assembly.

Final system acceptance testing in the Redstone and Jupiter programs was detailed by D. K. Meikle, Chrysler Missile Div. It is designed to achieve three major purposes: quality, functioning, and compatibility. Functionability is accomplished by establishing test methods which simulate conditions encountered in actual flight, thus double-checking on design. Quality control is assured by testing every component. Compatibility is assured by using final checkout equipment, functionally identical to the portable launching equipment used in the field.

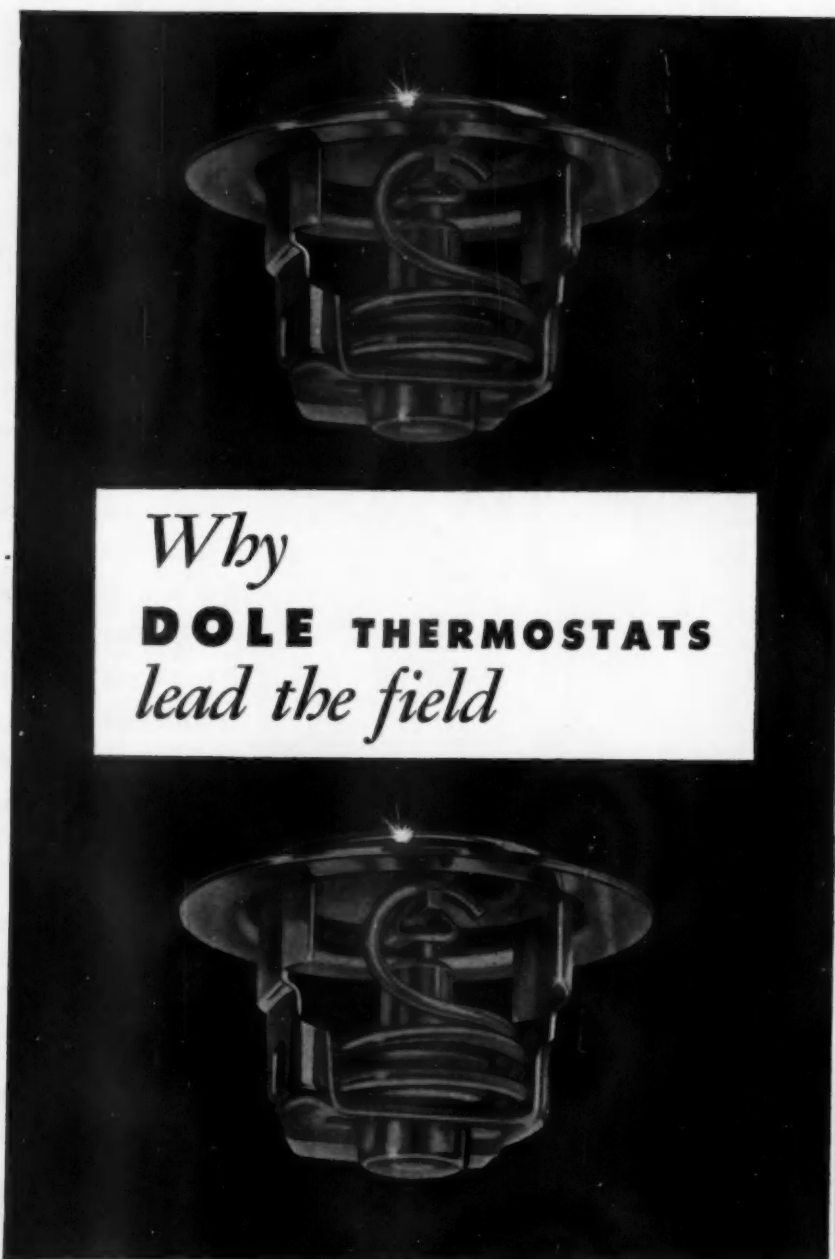
### Small Missile Test Equipment

Design and utilization of test equipment for small missiles were covered by W. W. Caskey, Jr., Tucson Operations, Hughes Aircraft Co. They have three basic policies

to guide the course of a test equipment program: maximum product reliability; minimum product cost; and maintenance of delivery schedules. Cost is of vital importance since the initial cost of automatic

equipment is from three to 10 times that of manual or semi-automatic equipment. A typical piece of production test equipment costs about \$30,000, with a minimum of only several thousand dollars, and a maximum up to \$500,000. Hughes considers the project system of engineering control necessary for the peacetime missile industry.

Arthur B. Billet, Vickers, Inc., described the line of miniaturized



*Why*  
**DOLE THERMOSTATS**  
*lead the field*

hydraulic missile components offered by his company. These include the following: Spacemaster servo valve, weighing 9.3 oz.; variable displacement pump, a 2.4-lb. package capable of flows up to 9.7 gpm at 24,000 rpm; fixed displacement pump weighing but  $\frac{2}{3}$ -lb, with a hydraulic output of 5-hp, and rated 3000-psi at 12,000 rpm; a miniature vane pump; high temperature pump; high temperature twin concentric-spool servo valve;

high temperature actuator. In addition, Vickers has developed complete hydraulic packages for missile systems.

Finally, there were a number of important papers dealing with problems of system reliability, field maintenance, and logistics. Among these was a report, dealing with the application of universal test equipment to the readiness and reliability of missile systems, by Lt. Col. Frank E. Napper of Red-

stone Arsenal. His thesis is that electronic test equipment now in the field has been designed specifically for one system and is packaged for that system alone. This approach results in an unnecessary duplication of common instruments, complicates the packaging problem, and costs too much.

What is now proposed is a universal package designed to test functions rather than any given chassis. It would apply automation to the functions of control, simulation, measurement, performance evaluation, visual indication, and data recording. Col. Napper believes that present-day technology is sufficiently advanced to provide such Universal Electronic Test Equipment, thereby saving manpower, training time, and dollars. ■

## Facts about "Who's Who" in thermostats

DOLE started on the road to leadership more than 50 years ago as a manufacturer of fine precision valves and controls.

DOLE pioneered and produced the first successful automotive waterline thermostat.

In 1946 DOLE pioneering paid off again with the development and introduction of the first satisfactory solid expansion type thermostat for automotive use.

In 1952 DOLE introduced a unique and highly efficient quality-control system which made possible volume production with the utmost in precision and dependability. (Each DOLE Thermostat is individually tested four different times . . . for leakage, temperature, flow and calibration.)

Today, DOLE Thermostats are standard equipment on 39 cars, trucks, commercial vehicles, tractors, industrial and marine engines. And that includes 17 out of 18 top passenger cars.\*

That's LEADERSHIP . . . earned . . . and retained year after year.

\*As listed in Automotive News.

Control with

# DOLE®

THE DOLE VALVE COMPANY

6201 OAKTON STREET, MORTON GROVE, ILLINOIS (Chicago Suburb)

Circle 207 on Inquiry Card for more data

AUTOMOTIVE INDUSTRIES, October 15, 1958

## Pontiacs for '59

(Continued from page 51)

clude many improvements. The new unit is more compact, has better performance and reduced operating noises and friction. An improvement in the linkage system produces a lighter feel with more positive control.

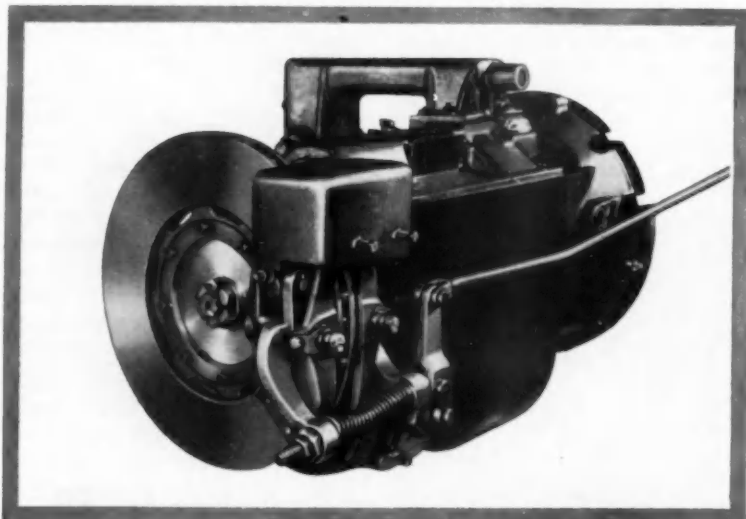
Both heater and air conditioning system have been greatly improved. A rear seat heating duct is a feature of the new heater-defroster unit. Pushbutton controls to the right of the steering column actuate the dash-mounted heater. The air conditioning system, which is new, incorporates a larger condenser and evaporator, new outlets and increased air flow. Vacuum-operated temperature and blower fan controls are readily accessible to the left of the steering column.

Among additional accessories available at the customer's option are: an electric windshield wiper and washer system; dual exhaust; a new outside mirror; a new rear speaker system; and a new power antenna mounted on the right rear fender at an angle of 27-deg. ■

**AUTOMOTIVE INDUSTRIES  
KEEPS YOU INFORMED**



## Automotive Equipment is Easier to Sell when equipped with TRU-STOP heavy-duty Brakes



### Positive Protection Against Runaway or Parking Accidents

TRU-STOP brakes operate directly on the drive shaft. This means that they are not only excellent parking brakes, but dependable emergency service brakes as well. There's no dangerous self-energizing. TRU-STOP brakes have the surplus capacity for repeated use as an auxiliary to service brakes.

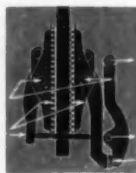
### 100% Ventilation Minimizes Fading

Brake efficiency depends on ability to dissipate heat rapidly and so prevent fading. TRU-STOP brakes are 100% ventilated. Discs are exposed to air even while braking. The TRU-STOP ventilation system circulates air between the disc plates.



### Longer Life with Uniform Brake Pressure

The discs of TRU-STOP brakes are squeezed between the flat surfaces of the shoes. The brake lever operates both the front and rear lever arms simultaneously, and pressure is exerted on the center of each shoe. This puts the entire lining surface in contact, provides for even wear. TRU-STOP brake linings are easy to replace.



### FOR POSITIVE PROTECTION...

**Specify TRU-STOP BRAKES on  
ANY Heavy-Duty Equipment  
that Requires Braking**

WRITE for Catalogs DH-33 and DH-530

**Automotive and Aircraft Division  
AMERICAN CHAIN & CABLE**



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2216 South Garfield Ave., Los Angeles 22 • 929 Connecticut Ave., Bridgeport 2, Conn.  
Circle 208 on Inquiry Card for more data

## Trends in the Construction Industry

(Continued from page 64)

outriggers extended, yet stripping down to 47,500 lb for transport;

The 100 Dumptor, a heavy-duty off-the-highway hauling unit of 10-cu-yd-capacity with pivoting operator's seat and two sets of controls so that operator may face in the direction of travel, torque converter drive and power steering, and choice of instantaneous gravity dump or controlled gravity dump with hydraulic cylinder snubbers;

Transverse Finisher, intended for one-man operation, with two oscillating screeds, adjustable to finish all types of concrete up to 30 ft wide;

Parsons 77 Trenchliner, ladder type, for digging trenches of 6 to 18 in. wide and to 5 ft deep;

Parsons 310 Trenchliner, ladder type, for digging trenches to 19 ft deep and 24 to 60 in. wide, or to 72 in. with dual boom;

Kwik-Mix Hi-Lift Fork Truck, having four-wheel drive with equal-size large tires, power steering, 70-hp Continental watercooled gasoline engine, Allison Torqmatic transmission, three-piece telescoping mast, hydraulically controlled, and having 4000 lb capacity at 24 in. load center at 22 ft 6 in. lift, or 6000 lb at 24 in. load center at 12 ft lift; and the

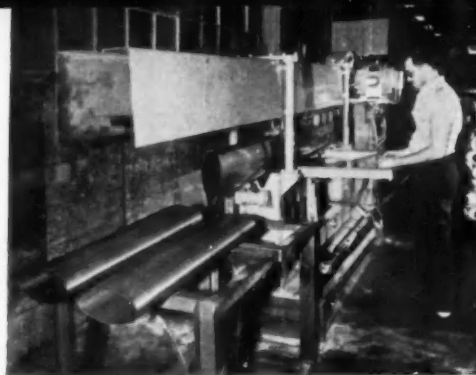
Kwik-Mix Plaster Mortar Mixer 6PM, with optional power plants, high alloy steel paddle shaft and replaceable rubber blades.

### Business Improving

As another indication of the improving state of business in the construction machinery industry, the Springfield (Ill.) Works of Allis-Chalmers Mfg. Co. recalled 1150 employees as of the middle of September, bringing to 1850 the number recalled from layoff.

A. C. Boock, general manager of the Springfield Works, said, "We foresee that the sales of our products will continue at a level that will allow our employees to continue in their jobs. There are indications that further boosts in production may be warranted."

At Mackenzie Muffler,  
workman is fabricating oval  
muffler shells from  
Youngstown Cold-Rolled  
Steel Sheets



## Accent on Excellence

### Youngstown cold-rolled sheets



Quieting today's 300-horsepower automobile engines to a barely audible whisper, are efficient mufflers made by Mackenzie Muffler Company of Youngstown, Ohio, that provide long-lasting service while undergoing the severest of climatic and operating conditions.

Mackenzie Mufflers, fabricated from shells of Youngstown Cold-Rolled Steel and internal components of Youngstown mechanical tubing, are found quietly at work under the flashy empenage of today's finest automobiles.

Wherever steel becomes a part of things you make, the high standards of Youngstown quality, the personal touch in Youngstown service will help you create products with an "accent on excellence".



THE

**YOUNGSTOWN**

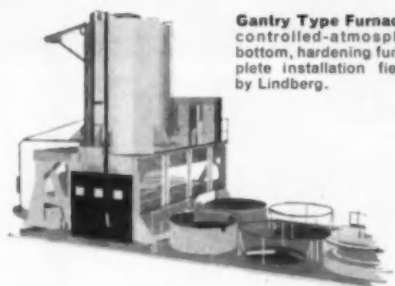
SHEET AND TUBE COMPANY

*Manufacturers of Carbon, Alloy and Tool Steel, Youngstown, Ohio*

Circle 209 on Inquiry Card for more data

Wherever industry needs heat...

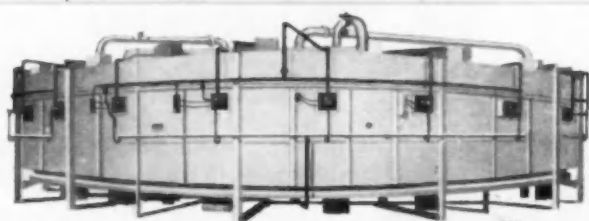
You'll find **LINDBERG** equipment  
just right for the specific job



**Gantry Type Furnace:** Vertical, controlled-atmosphere, drop bottom, hardening furnace. Complete installation field-installed by Lindberg.



**Roller Hearth Furnaces:** Continuous electric type (shown) with temperature range 1300° to 2100° F.



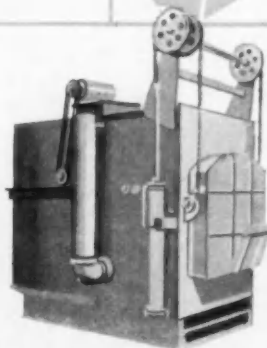
**Rotary Hearth Furnaces:** Doughnut type field-installed gas-fired furnace (shown) with capacity of 13,000 lbs. per hour.



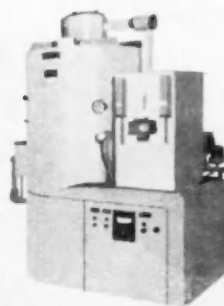
**HF Induction Heating Units:** Available in 5, 10, 25 and 50 KW units.



**Vertical Type Furnaces:** Carburizing and hardening furnace (shown) with CORRTHERM electrical heating elements.



**Super-Cyclone Tempering Furnace:** Production box type. Electric or gas. Two temperature ranges—to 1750° F.



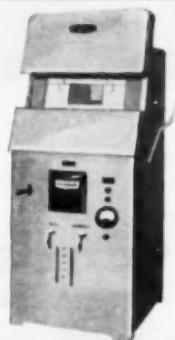
**Atmosphere Generators:** Hyen generator (shown) for endothermic atmospheres. Generators for all required atmospheres.



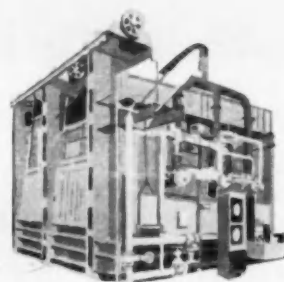
**Ceramic Kilns:** Gas-fired periodic kiln (shown) with temperature range to 3250° F.



**Melting and Holding Furnaces:** Electric resistance furnace (shown) with capacities of 750 lbs. to 1500 lbs.



**Laboratory Equipment:** One-unit box furnace (shown), muffle or for non-oxidizing atmosphere with temperature range to 3000° F.



**Aluminum Reverberatory Furnaces:** Twin-chamber melting and holding furnace (shown) with 45,000 lbs. capacity.



**Lindberg-Designed**

## heat treating installation reduces jet engine parts pickling costs 25% for Jervis

This specially designed annealing and heat treating furnace at Jervis Corporation, Grandville, Michigan, is an interesting example of how cooperation between the user and the maker of heat treating equipment can adopt established furnace principles to the improvement of production methods. Jervis and Lindberg engineers, starting with a conventional box type furnace, designed this furnace with two chambers, one for preheat and one for high heat, and added a third with a water jacket for protective cooling. This combination provides efficient heat equalization, protective atmosphere, and protects against corrosion and carbide precipitation. Jervis estimates this furnace provides a 25% reduction in pickling costs, as well as improved quality, in the treating of jet engine parts.

Lindberg equipment and Lindberg planning can help you find the most effective answer to any problem of applying heat to industry. We cover the field, heat treating, melting and holding, tempering, brazing, enameling furnaces, ceramic kilns, high frequency units, and are in the ideal position to recommend just the type of equipment most suitable for your needs. This can be factory built or field-installed in your own plant, fuel-fired or electric. Consult your local Lindberg Field Representative (see the classified phone book) or get in touch with us direct. Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

★ Look up Lindberg

Booth 331 at the Metal Show

# LINDBERG

heat for industry

Circle 210 on Inquiry Card for more data



The handsome Jervis plant at Grandville, Michigan occupies 238,300 square feet of floor space.



Mr. James Bockheim, Metallurgist at Jervis, says, "We can handle any aircraft material in this furnace . . . and operate it with just one man."

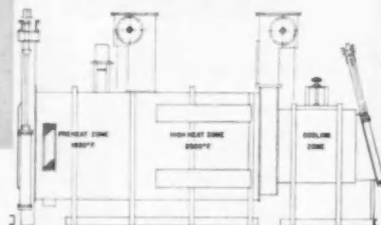
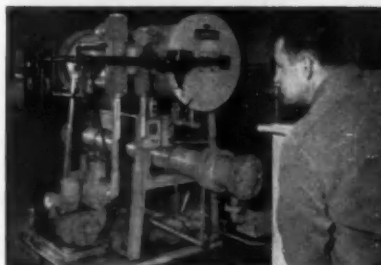


Diagram shows the unusual three-chamber furnace design.



Work coming from the cooling chamber after treatment.



Lindberg generator produces furnace atmosphere exothermically from natural gas.



## Aluminizing Valves

(Continued from page 65)

was guaranteed.

The evolved principles were applied in the installation set up in Thompson's new valve plant. It makes use of an Allis-Chalmers Type EI-50C (50-kw output) vacuum tube induction heater, with remote heating station, installed adjacent to a DeVilbiss conveyor. The sequence of operations follows:

After a degreasing operation, the valves are manually inserted into the holding fixture of the DeVilbiss conveyor.

As the valves enter the preheat 10,000-cycle induction work coil, the workholders are rotated by a variable-speed drive belt to afford a uniform heat pattern of about 400 to 600 F. A hairpin watercooled type work coil is positioned in a manner to allow the valve heads to enter between the coil turns. The coil length is consistent with the

number of valves required per hour and the conveyor speed. Through-heat at this point is desired to raise the total ambient level, gaining more effective heat application in the main coil section.

The valves upon leaving the pre-heat station enter the metallizing spray area where they are again rotated. An aluminum spray of 0.05 to 0.10 gram is uniformly deposited on the valve seat area.

Aluminized valves then enter a longer high-frequency hairpin type watercooled work coil and are heated to about 1600 F. High-frequency energy at 450,000 cps produces a uniformly-controlled localized heat pattern. As the valves reach temperature, the aluminum melts and combines with the steel, forming an aluminum-iron alloy layer.

The valves then go to a cooling chamber where they are reduced in temperature to allow manual removal from the conveyor.

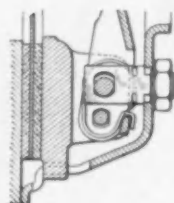
The electronic heater is a completely self-contained unit housed in a substantial metal cabinet. Being a static device, several normal maintenance problems have been avoided. Its reliability has been proven in many hours of trouble-free operation.

Application of induction heat in this process provides tangible improvements over the former aluminum immersion and salt bath methods. In part, these have been manifested in reduced production cost, and, more important, in a high standard of quality obtained through use of the 450,000-cycle electronic heater. ■

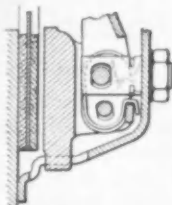
## ROCKFORD PATENTED CLUTCH LEVERS

Reduce friction  
and wear

• Improve  
clutch release  
action • and  
Prevent lever  
throw-out



Patent No.  
2818952



Small  
Spring Loaded



Heavy Duty  
Spring Loaded



Oil or Dry  
Multiple Disc



Heavy Duty  
Over Center



Power  
Take-Offs



Speed  
Reducers

Patented rolling fulcrum pin action, in the release lever, results in much less friction and wear, and smoother release operation in this clutch than in some other types of clutches. Pin automatically returns to original position. Carefully balanced levers avoid lever throw-out at high speeds.



**SEND FOR THIS HANDY BULLETIN**

Gives dimensions, capacity tables and complete specifications. Suggests typical applications.



**ROCKFORD Clutch Division BORG-WARNER**

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

# CLUTCHES

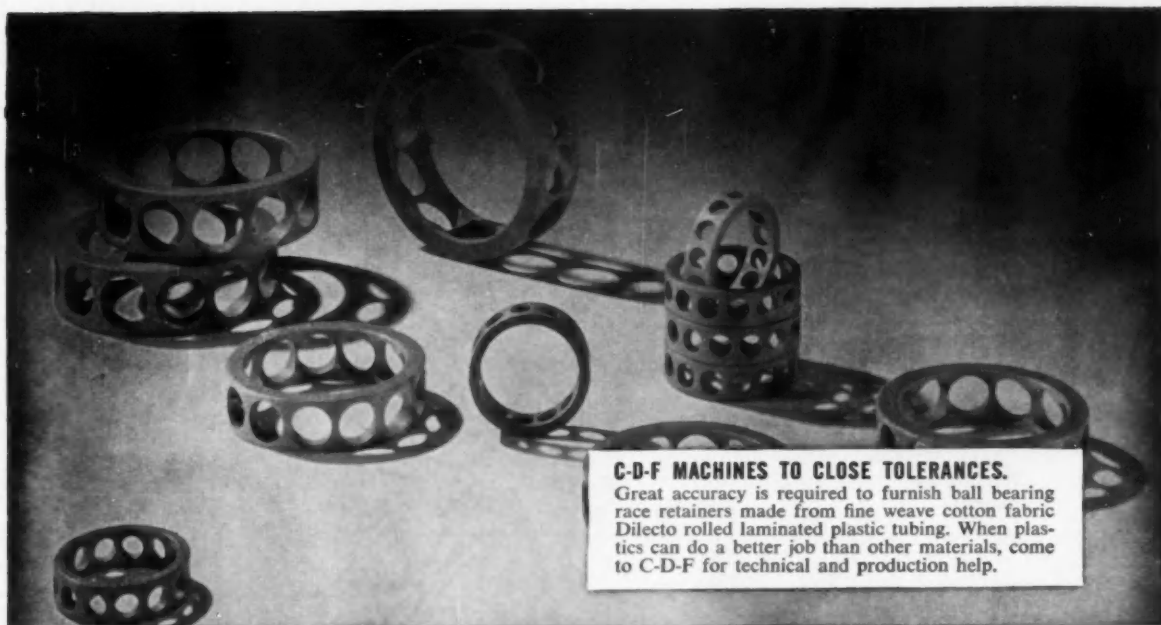
Circle 211 on Inquiry Card for more data

## Ford Truck Line

(Continued from page 56)

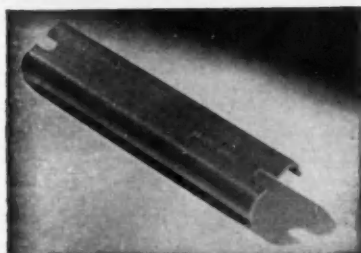
specified combination of engines, clutches, etc. Transmatic drive can be specified for the F-500, F-600, F-700, F-750 and F-800; C-550, C-600, C-700, C-750 and C-800; T-700, T-750, T-800; and on all school bus chassis.

The 8-speed Roadranger transmission is available in the following series: F-800 through F-1100; C-800 through C-1100; T-750 through T-950. ■

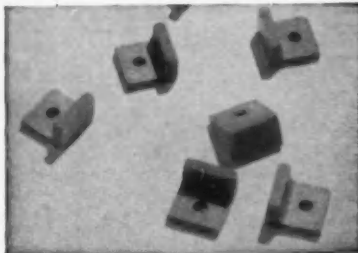


#### C-D-F MACHINES TO CLOSE TOLERANCES.

Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



**C-D-F PIONEERED IN POST-FORMING** of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.

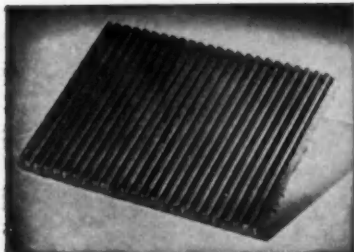


**C-D-F DOES THE UNUSUAL.** These rubbing blocks are made from fine-weave cotton cloth Dilecto molded tubing that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.

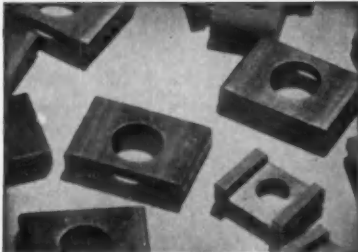


**C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING** of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

## Yes, C D F is a big reliable source for fabricated plastics!



**C-D-F SERVES MANY INDUSTRIES** with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.



**C-D-F IS A PUNCHING SPECIALIST** on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.



**C-D-F COMES UP WITH THE ANSWERS** to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.



## CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE *Budd* COMPANY • NEWARK 2, DEL.

# GEAR PROBLEMS?

—check with  
**FAIRFIELD!**

**G**EAR PERFORMANCE to match the ever-increasing power and speed of modern machines is a Fairfield specialty. This is possible because Fairfield has long held a position of leadership in utilizing the most advanced methods, equipment, and techniques for producing better gears. By keeping abreast with modern engineering trends, Fairfield renders an invaluable service to many of the nation's leading machinery builders.

If you have a gear problem, check with Fairfield. Our engineers are well-qualified to give you expert recommendations. **CALL OR WRITE.**

**SPUR GEARS**—Straight, helical, and internal. Sizes from 16 pitch, 1½" dia., to 1½ pitch, 36" dia.

**HERRINGBONE**—(Fellows Type). Sizes from 1½" to 15"

**SPIRAL BEVEL**—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

**STRAIGHT BEVEL**—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

**HYPOID**—Sizes from 1½" to 28" dia.

**ZEROL**—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 21" dia.

**WORMS AND WORM GEARS**—Worms to 7" dia. Worm gears to 36" dia.

**SPLINED SHAFTS**—Lengths to 72".

**DIFFERENTIALS**—3,000 to 500,000 inch pounds capacity.

Note: All of the sizes above are approximate.

## FAIRFIELD MANUFACTURING CO.

2303 S. Concord Rd. Lafayette, Indiana  
TELEPHONE: 2-7353

Ask for interesting, illustrated bulletin.



Gears and Differentials

Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES  
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

Circle 213 on Inquiry Card for more data

## More Government Contract Awards

**L**ATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period August 26 to September 30, inclusive.

**BENDIX AVIATION CORP., BENDIX PRODUCTS DIV., South Bend, Ind.**  
Brake assy KC-97, B-50 Aircraft—1000 ea—\$1,002,000

**BENDIX AVIATION CORP., BENDIX PRODUCTS DIV., South Bend, Ind.**  
Spare parts, B-50 aircraft—\$167,494

**BROWN & SHARPE MFG. CO., Providence, R. I.**  
Brown & Sharpe No. 2, machine—1 ea—\$28,945

**CHAMPION SPARK PLUG CO., Toledo, Ohio**

Spark plugs, aircraft reciprocating—153,300 ea—\$202,356

**CINCINNATI MILLING AND GRINDING MACHINES, INC., Cincinnati, Ohio**

Model 2 milling machine—1 ea—\$39,010

**CINROCK MACHINERY INC., Clifton, N. J.**

Jlg borer—\$57,618

**CONTINENTAL MOTORS CORP., AUTOMOTIVE DIV., Muskegon, Mich.**

Engine gasoline, 6 cyl.—25 ea—\$127,570

**CONTINENTAL MOTORS CORP., MILITARY DIV., Muskegon, Mich.**

Automotive spare parts—\$40,075

**CURTISS-WRIGHT CORP., Detroit, Mich.**

Automotive spare parts, replenishment—\$72,879

**DIAMOND T MOTOR TRUCK CO., Washington, D. C.**

Truck-tractor—2 ea—\$19,614

**DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif.**

AD spares, fittings and supports—\$45,679

**DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif.**

F4D-1 aircraft, amplifier assys—\$40,628

**DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.**

Repair parts, Nike System—\$165,324

**DOUGLAS AIRCRAFT CO., INC., Charlotte, N. C.**

Nike spare parts and components—\$60,070

**ELECTRIC AUTO-LITE CO., Toledo, Ohio**

Spark plugs, aircraft reciprocating—22,554 ea—\$26,252

**FORD MOTOR CO., FORD DIV., Washington, D. C.**

Trucks—70 ea—\$191,636

**FUEHAUF TRAILER CO., Seattle, Wash.**

Trailers—4 ea—\$15,320

**GENERAL MOTORS CORP., AC SPARK PLUG DIV., Flint, Mich.**

Spark plug, aircraft reciprocating—25920 ea—\$32,918

**GENERAL MOTORS CORP., CHEVROLET MOTOR DIV., Detroit, Mich.**

Trucks—85 ea—\$194,860

**GENERAL MOTORS CORP., FOREIGN DIST. DIV., New York, N. Y.**

Trucks—5 ea—\$16,854

(Turn to page 128, please)

# RB&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



## Technical-ities

By John S. Davey

### Select proper bolt diameter

An erroneous rule of thumb worth forgetting is that no bolt under  $\frac{1}{2}$ " should be used where fastened members are under stress. Yet bolts  $\frac{1}{2}$ -inch and smaller take plenty of external loading.

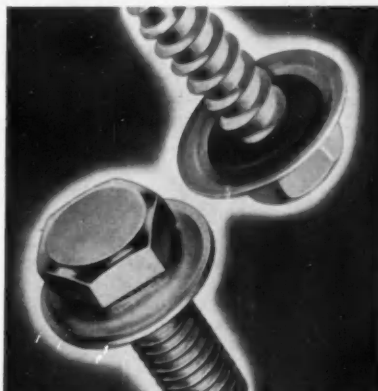
#### HOW TO LOOK AT IT

Primarily, you have to satisfy the stress requirements . . . the load. So select bolts on that same basis: the actual strength to sustain that load.

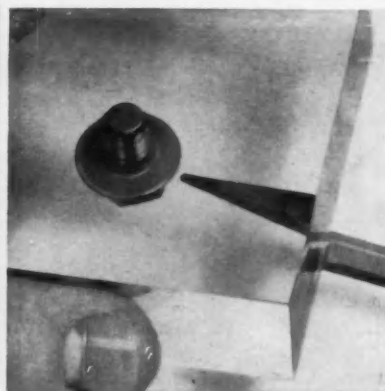
Calculating the strength requirements will tell you what bolt tensile, size, and number you need. If smaller bolts suffice, use them to avoid the penalty of overdesign. Holes can be smaller which means faster drilling and tapping. You have a chance to save materials since with smaller bolt holes, fastened members can often be made smaller too. You may also be able to standardize on a single size, saving assembly-line time.

#### SIZE VS. SAFETY

Remember that for a given grade of material, size tells you *capacity* of a bolt, not its *safety*. If you tighten a bolt to capacity, then you get safety. That's why a smaller bolt properly tightened is better and safer than a larger bolt sloppily tightened, especially where the loads are dynamic. Obviously, you reduce risk of under-torqued bolts as you reduce their size.



The new RB&W "SPIN SEAL" fasteners have spring-type washer with adhering flow-in seal . . . pre-assembled to standard machine or tapping screw.



Flow-in sealant is confined by washer. Note how seal fills space under head and flows around and into threads in tightened SPIN-SEAL screw.

## New SPIN-SEAL\* screws give leakproof fastening

Here is a new type of composite fastener that seals by means of a unique flow-in sealant and washer.†

#### ASSURES TRIPLE SEAL

Concave in shape, the heat treated springy washer confines and controls the flow of sealing compound. Tightening the screw forces sealant into various spaces around (1)



When screw is tightened the compound seals clearance hole and top thread; between washer and surface; between head and washer.



threads, (2) head and (3) clearance hole to give hermetic sealing.

The washer has ability to conform to curved surfaces and still seal securely against hydrostatic

pressures and wind driven water. Its spring tension and flat rim give the added advantage of dynamic metal to metal seal.

#### ONLY THE SCREW TURNS

Washer does not turn with the screw. This prevents twisting or tearing the sealing "gasket", marring of polished surfaces, or gouging of painted finishes.

The flow-in gasketing compound is plastic rather than elastic. Stable and non aging, it won't split or ozone-check under pressure. It gives controlled flow into clearance spaces. Compounds are available to seal out water or oil.

Send for Bulletin SS-1 which gives details on RB&W "SPIN-SEAL" fasteners. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

\* U.S. Pat. Pend.

† U. S. & Can. Pats. Pend.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.



# O-RINGS



**YOU GET  
EXACTLY  
WHAT YOU  
NEED from**

**Goshen  
Rubber**

**CUSTOM MOLDING • CUSTOM COMPOUNDING**

If you're looking for O-rings to perform under today's greater temperature ranges, higher pressures, and other severe conditions, look to Goshen. Here custom compounding of natural, synthetic and silicone rubbers is performed by experts in developing the exact combination of properties required in your seal. GRC O-rings are available in a complete range of AN, MS, SAE and JIC standard sizes, plus many non-standard sizes and special shapes. We'll gladly work with you in adapting to your application the correct GRC O-ring.

Ask for free copy of  
GRC O-ring brochure. 16 pages of  
useful information.



**Goshen Rubber Co., Inc.**

2710-8 S. TENTH ST., GOSHEN, INDIANA



**ON OUR  
WASHINGTON WIRE**

Aggressive spy work, not engineering ability, has thrust Russia ahead, Lt. Gen. Trudeau says. He claims the great gains in Red technology are due chiefly to industrial secrets stolen in the U. S. over a period of years. His warning: Firms holding Government contracts must get tough about plant visitors and check deeper into after-hour doings of their employees.

Air Force ballistic programs may soon give the U. S. clear superiority over the Russians, top missilemen believe. Even now, actual U. S. production of ICBM's is probably greater than Russia's, these sources say. They add that the Air Force is on the verge of success in its Atlas program, and that this will give the U.S. a clear superiority.

The Russian Government is hinting more broadly than ever that it wants to order large quantities of machinery in the U.S. But here's the catch: The Russians want to buy much more from us than we need or want from them. Result: An imbalance of trade.

The Reds propose that we extend them credit for the machinery they want to buy. But they are notorious for failing to pay their bills, as governments all over the world have learned to their regret. (Our State Dept. is still trying to collect for goods shipped under the lend-lease laws of the 1940s.)

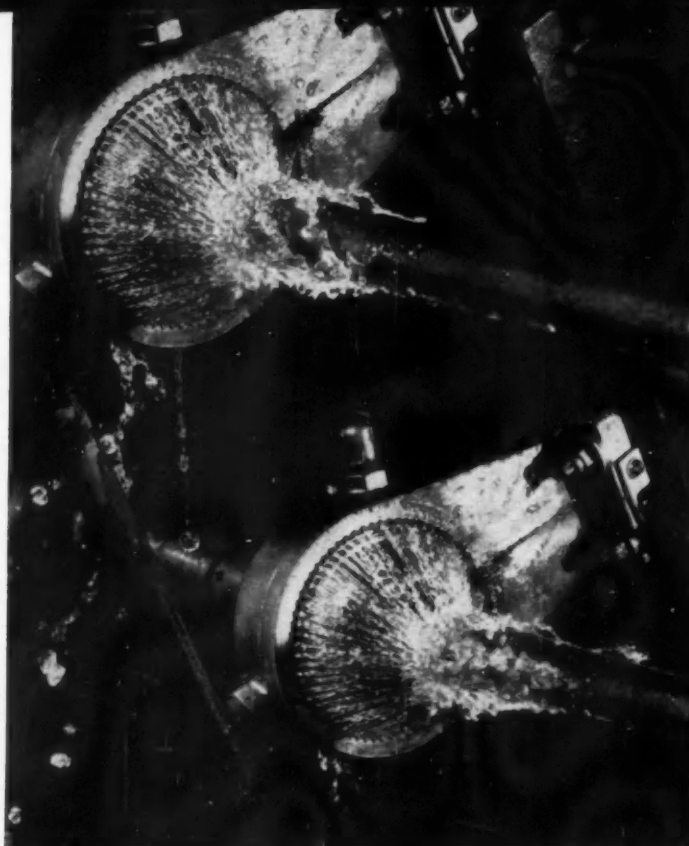
As a result, the Russian offer to "buy" U.S. machinery is producing no excitement among foreign-trade planners in Washington. Unless and until the Reds put cash on the barrelhead their planned "purchases" probably will never get beyond the talking stage.

The first authentic detailed peek into the makeup of mineral and metal resources in countries in the Eastern half of the world, particularly Russia, will be available about the first of December.

Among other things, the report—by the staff of the Senate Interior Committee—will show that while Russia's mineral and metal resources are considerable, the production costs by Western standards are extremely high. One reason for these high costs, the study will show, is the inaccessibility of most of the Red deposits.

Other factors include high transportation costs, lack of widespread mechanization, and the problems of housing and feeding convict labor which mines much of the production.

# How Westinghouse Induction Heating Saved \$152,880



Here is how Hightower-Morse & Company is successfully meeting the cost-price squeeze with Westinghouse Induction Heating. In the horizontal hardening of automotive axles, this progressive manufacturer found it imperative to invest in modern equipment to produce an improved product and

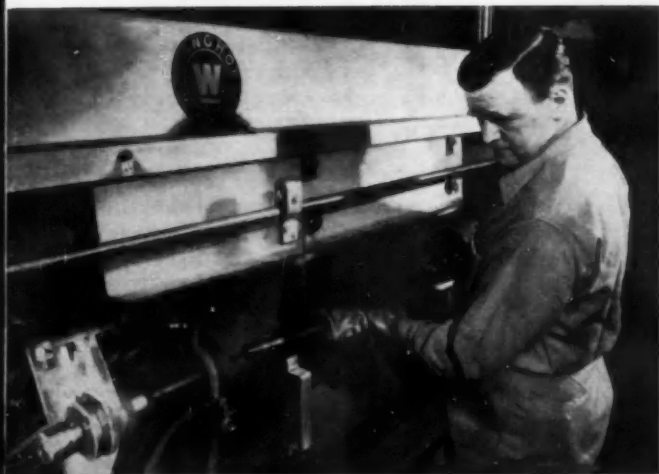
hold the price to customers at a reasonable level. Here are the facts:

## SAVING PER AXLE

1046 carbon steel replaces costly  
4145 alloy steel, yet scores high  
Rockwell hardness and greater toughness ..... 75¢  
Eliminates a stress-relief operation ..... 13¢  
Previously, all axles were hardness-tested;  
now necessary to spot-test only 3% ..... 5¢  
Hobbing machine cutters last longer ..... 3¢  
Drills last longer ..... 1/3¢  
Lathe tools last longer ..... 1/5¢  
Increases production because of less  
down time for changing cutting tools ..... 1-9/10¢

Another saving—gas furnaces must run 24 hours a day at estimated \$10 per-hour fuel cost, but Westinghouse Induction Heating uses current only when work is going through; electricity costs \$3.50 per hour.

What's your problem—rejects, high costs, quality control? Your Westinghouse Induction Heating specialist can suggest applications in your plant for Westinghouse integrated production-line equipment.



Axles pass through coils of Westinghouse horizontal scanner two at a time at Hightower-Morse & Company. This one-man operation requires 60% less space than furnace heating; gives exact control of temperature and quench.

J-35005-R

NEW—from Westinghouse Engineering and Development—LOW DISTORTION Induction Hardening Machine. It combines hardening, drawing and distortion reduction in one operation. Ask your Westinghouse specialist for complete information.

YOU CAN BE SURE...IF IT'S **Westinghouse**



Circle 216 on Inquiry Card for more data

# SAE Milwaukee Meeting

(Continued from page 67)

## Reduction of Costs

Cost reduction should begin with the designer, said the panel on that subject at the Production Forum. Where practical, the same component design should be repeatedly used so as to reduce the number of dies needed for production and the number of parts to be carried

in inventory. Because the maximum opportunity for cost reduction occurs when the design is being set up, rather than after production has begun, the manufacturing engineer should work closely with the designer from the start of the project, suggesting best use of materials, setting of tolerances, specifying finish, and so on.

## Ceramic Tooling

Ceramic tooling, as a supplement to conventional tooling for fast metal cutting, is winning a place for itself economically and upon various steels. Costing about twice as much as carbide tools, it can cut at twice the speed even on present equipment. Higher powered, faster-running machine tools would be needed to realize its full potential. Even at 2000 rpm, however, machine tools have troubles in bearings and in lubrication. Ceramic tools can be shaped in the plant with silicon carbide or diamond wheels.

## Leaded Steels

Leaded steels have no advantage in parts where a large amount of steel is used with a small amount of machining, but show substantial savings when the reverse is true. Productivity may increase 25 per cent with these free-machining steels. Grinding wheels are not loaded by leaded steels, as the amount of lead content is about 1/8 per cent.

## Carbide Tools

Only about one worker in ten can grind carbide tools properly, it was reported, so it is important that all grinding be done in the tool department rather than on floor grinders. Carbide tools are being used in many places where high-speed-steel tools would be more economical, members stated.


## Aircooled Engines

With a high output engine, producing about 90 hp per cylinder, and having about 3500 sq in. area of cooling, the optimum air velocity across the fins would be equal to a reading of three inches of water, the panel on Cooling Industrial Aircooled Engines stated. New casting methods promise production of molds or dies for forming fins to a tolerance of 0.003 to 0.005-in. per inch, and with three to five microinch surface finish. Piston rings for use in all-aluminum cylinder bores should be plain cast iron, wire brushed; in high output engines they should be chrome plated, and top compression rings should be used.

(Turn to page 114, please)

## Dual VISION-AID HEADLAMPS



 **TUNG-SOL ELECTRIC INC.**  
NEWARK 4, NEW JERSEY

Sales Offices: Atlanta, Ga.; Columbus, Ohio; Culver City, Calif.; Dallas, Tex.; Denver, Colo.; Detroit, Mich.; Melrose Park, Ill.; Irvington, N. J.; Newark, N. J.; Philadelphia, Pa.; Seattle, Wash. Canada: Montreal, P. Q.

Circle 217 on Inquiry Card for more data

## Evaluating the Machinability of Alloy and Carbon Steels



To produce a useful part, most steel has to be shaped by one or more of the metal forming methods. One of these is metal cutting or machining, which changes the shape, size, or finish of a workpiece.

Alloy or carbon steels are often received from the mill in the raw form of bars, forgings, or castings. The steel is placed in a suitable machine, such as a lathe, multiple-spindle automatic bar machine, drill press, milling machine, or one of a number of other types. Metal is then removed from the steel stock until it has acquired the desired shape. This is accomplished by causing motion to take place in the sharp-edged cutting tool, or the piece of steel, while they are held in contact with each other. Cutting tools, such as drills, tool bits, milling cutters, and the like, are made from highly-alloyed steel (tool steel), cast alloys, sintered carbide, or even ceramic material.

During machining, the metal is removed in the form of chips which may be of any length, from the short, well-broken type, to the long, stringy and continuous variety—depending upon the nature of the steel, the shape or geometry of the cutting tool, the speed and feed at which the cutting is done, and the coolant or cutting fluid applied.

"Machinability" of steel refers primarily to the ease with which it can be reduced to its final shape. It is measured by the speed and feed at which it can be cut, the quality of the surface finish produced, the length of time the tools will

last, and the kind of chip formed in cutting. In a "free-machining" grade of steel, for example, high speeds and feeds can be used, tools will stand up well, surface finish will be good, and chips well broken.

Machinability is evaluated in the shop by the number of pieces having a satisfactory finish, within the required dimensional tolerances, that can be produced in a shift, or a day, with adequate tool life.

It can be appreciated that the study of the cutting of metals involves a large number of variables. These may be grouped in the following way:

1. Steel Analysis (Process, composition, microstructure, and mechanical properties)
2. Machine Tool (Condition, tool accessories, range of cutting speeds and feeds with ample power, etc.)
3. Type of Machining Process (Turning, milling, forming, broaching, etc.)
4. Cutting Condition (Speeds, feeds, and depth of cut)
5. Cutting Tool (Composition, treatment, hardness, size, shape, grinding and surface finish)
6. Cutting Fluid (Characteristics, application, and volume)

From this number of complex factors, laboratory tests and investigations have developed experimental data by using single variables, such as steel analysis, tool analysis, tool shapes, and cutting fluids. This information has proved to be a useful guide when combined with industrial experience; for no test method by itself has yet been developed that will include all the characteristics of a specific single or multiple-machining operation.

Bethlehem metallurgical engineers have had long and varied experience and knowledge on the machinability of alloy and carbon steels. They will gladly give you any help you may require in connection with machining problems.

In addition to manufacturing all AISI standard alloy steels, Bethlehem produces other than standard analysis steels, and the full range of carbon grades. Call your nearest Bethlehem sales office for information.

*If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in this series are now available in a handy 44-page booklet, and we shall be glad to send you a free copy.*

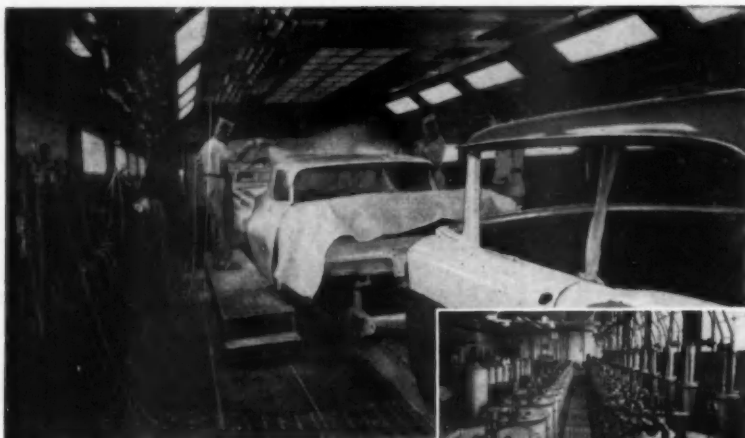
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation

# BETHLEHEM STEEL







Binks Model 19 spray guns apply finishes to hundreds of cars a day at Ford Motor Company's Mercury plant in Hazelwood, Missouri.

Binks Model Kayo 32 high-volume pumps and paint circulating system make 16 identical colors available throughout the plant.



## AT FORD MOTOR COMPANY'S ST. LOUIS MERCURY PLANT New, Binks Kayo 32 pumps supply 16 matched colors to 60 painters

Binks new Kayo 32 high-volume pumps are the heart of a Binks paint circulating system that supplies 16 identical matched colors to 60 spray stations in Ford Motor Company's M-E-L Division plant in Hazelwood, Missouri.

### Demand-type pumps

At any given time, from 1 to 60 painters may be using the same color. Binks Kayo 32 air-operated, high-volume pumps automatically adjust their delivery rate to handle this fluctuating volume demand. Set by Ford engineers to deliver paints at 4 gpm, these pumps have reserve capacity to send up to 10 gpm through each 6000-foot pipe circuit.

### Laboratory mixing control

Paint color and viscosity are controlled under laboratory condi-

tions in a separate mixing and pumping room. Finishes are constantly mixed by air-operated agitators in 60-gallon tanks. One Kayo 32 pump and a pair of tanks are used for each of the 16 colors.

### Painters change colors quickly

Binks Model 19 spray guns are equipped with quick-detachable fluid connections. To change colors a painter simply detaches his spray gun from one line and snaps it to another.

### Send for Bulletin A41-5

Get complete descriptions on entire Kayo series pump line. Copies available from your nearest Binks industrial distributor, Binks Branch Office, or write to the address below.



Ask about our spray painting school  
Open to all...NO TUITION...covers all phases.



VISIT  
BOOTH  
1501

National Metal Exposition & Congress  
Cleveland, Ohio, October 27-31

See Modular Electrostatic Spraying  
and memory-controlled automatics

**Binks Manufacturing Company**  
3120-30 Carroll Ave. West, Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY  
Circle 219 on Inquiry Card for more data

## SAE Milwaukee Meeting

(Continued from page 112)

### Welding Methods

Several new welding processes were announced at the welding session. Foil seam butt welding was mentioned as a new process from Germany; while Magnafash welding promises minimum increase in joint thickness, good appearance, good strength and ductility, and welding speeds of 5 to 20 fpm. Carbon dioxide welding provides very fast welding speeds with a deep penetrating arc. Any metal could be welded with the proper wire and shielding gas, the panel agreed. CO<sub>2</sub> spot arc welding is used to supplement resistance welding. It can be made in material of a maximum thickness of 3/16-in. without a hole in the upper piece, the arc driving through the upper piece to form a bond between the two layers. Thicknesses greater than 3/16-in. require a hole 20 per cent greater in diameter than the thickness of the top sheet. The process would find application in places inaccessible to electrodes or the arc.

### BUSINESS PULSE

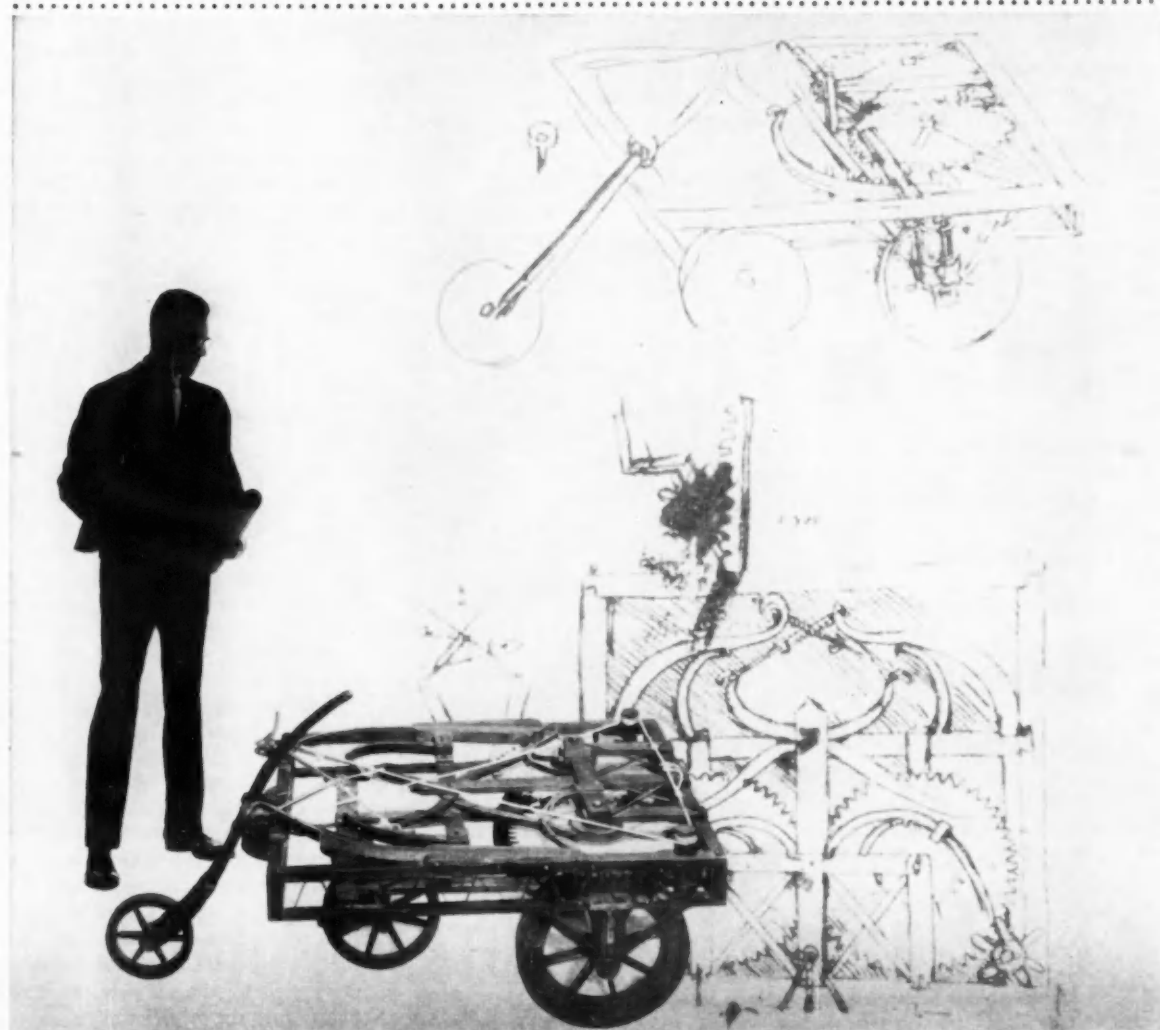
(Continued from page 86)

ever, it seems improbable that the influence on actual building rates will be very pronounced during the next several months.

### Better Outlook For Capital Spending

By far the most reassuring development of recent weeks was the disclosure by the Government that a recently conducted survey indicates that the decline in capital spending may already be over and that some modest uptrend may begin to emerge in this sector before the end of the year. It would be difficult to overemphasize the significance of these survey findings, for until their release it had been commonly assumed that outlays for plant and equipment would continue to decline well into 1959 and act as a drag on the recovery.

creative designing calls for an open mind



Leonardo da Vinci's design for a self-driven car

Scale model courtesy of IBM

**EVEN DA VINCI'S SELF-DRIVEN CAR COULD HAVE BEEN BETTER WITH HELP FROM AN SKF ENGINEER.**

When you receive the recommendations of an SKF engineer, you know they are in no way determined by possible restrictions in his product line. That's because the SKF line includes all four types of ball and roller bearings, in many thousands of sizes. This gives every SKF engineer the kind of flexibility he needs to keep an entirely open mind on any bearing problem. Give us your problem and see.

7858



Spherical, Cylindrical, Ball, and Tapered Roller Bearings

EVERY TYPE—EVERY USE

**SKF**

SKF INDUSTRIES, INC., PHILADELPHIA 22, PA.

\*REG. U.S. PAT. OFF.

## Larger Engines Offered in New Dodge Passenger Cars

(Continued from page 60)

Royal and Custom Sierra models also use this engine, but higher output is obtained through use of a four-barrel carburetor.

Two D-500 modifications are offered in 1959 on all V-8 models. Both are of 383 cu in. piston dis-

placement. The regular D-500 has a single four-barrel carburetor and dual exhausts; while the full-D-500 modification has two four-barrel carburetors, dual exhausts, a special camshaft, and heavier valve springs.

# JOHNSON

*brings you the latest development in heat treatment of hardenable iron tappets.*

**INDUCTION  
HARDENED  
TAPPET FACE**



unretouched photo,  
twice size

Hardenable iron tappets have helped to solve many of the cam and tappet face wear problems in modern overhead valve engines. Now, this improved method of heat treating by Johnson provides greater uniformity, excellent wearing characteristics, PLUS lower cost. We'll be happy to show you proof of this latest tappet improvement.



"Tappets are our business"

**JOHNSON *JP* PRODUCTS  
INC.**

**MUSKEGON, MICHIGAN**

Circle 221 on Inquiry Card for more data

The six-cylinder 230-cu-in. L-head engine is continued as standard equipment in the Coronet 6.

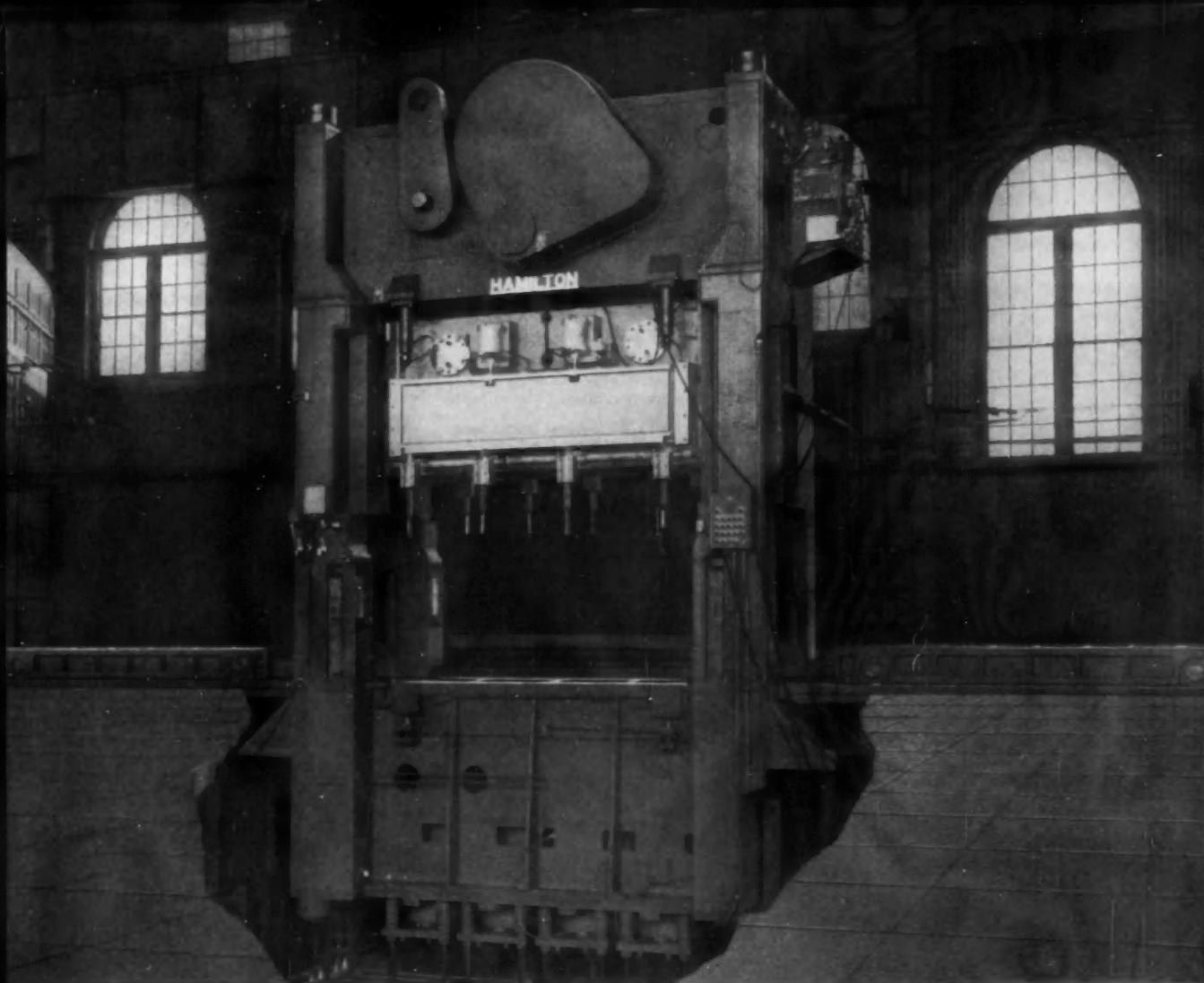
Three transmissions are being offered. The three-speed mechanical transmission is standard on the Coronet 6 and 8 models, and on the Sierra station wagon. PowerFlite is standard on the Royal, and available at extra cost on Coronet 6 and 8 models. TorqueFlite is standard on the Custom Royal and Custom Sierra models, and special equipment on the Coronet V-8, Royal, and Sierra station wagon. On D-500 powered models, TorqueFlite is standard.

Lubricant of PowerFlite and TorqueFlite transmissions is now cooled by a heat exchanger located in the bottom tank of the radiator. The torque converter housing has been sealed.

Torsion-Aire front suspension for 1959 has three improvements—an infinitely variable cam adjustment for caster and camber settings; four-inch shorter torsion bars of 1/32-in. less diameter, with new anchor-point seals; and redesigned ball joints for more effective lubricant distribution and reduced friction.

Rear air suspension, called Level-Flite, is optional on all V-8 models. The system uses air springs in combination with leaf springs. When the car is empty, the air springs support about 300 lb of the weight on the rear axle. The remaining load is supported by the leaf springs, which are of a lower rate than those normally used. As the car is loaded, the load increase is carried by the air springs. Primary purpose of the system is to provide automatic height compensation. Illustrations of the new front and rear suspensions were contained in AI of September 15, page 50. ■

**AUTOMOTIVE  
INDUSTRIES . . .  
is your News Magazine of  
Automotive and Aviation  
MANUFACTURING**



Sliding bolsters on this new Hamilton press are shown here in the outermost positions for die loading and/or unloading.

## HAMILTON ANNOUNCES A RADICAL NEW PRESS DESIGN

This new Hamilton straight-side press—using sliding bolsters and preset dies—is a radical advance in design for performing such operations as blanking, drawing and forming. Its principal feature is the rapidity with which dies can be changed—and the resulting increase in production. As little as 15 minutes need elapse between the end of one production run and the start of another.

This new Hamilton press is ideal for short runs, assures minimum downtime for changing

dies, means higher production than two conventional presses in many instances. At the same time, it eliminates both the cost of a second press and of additional operators. Also the sliding bolster feature does away with the time-consuming method of jockeying dies with both cranes and fork trucks—an overhead crane can be used exclusively.

Write today to Dept. 7-K for full details on the high production, cost-saving Hamilton press.

**Hamilton Division** Hamilton, Ohio  
**BALDWIN · LIMA · HAMILTON**

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools & general machinery

Circle 222 on Inquiry Card for more data





## MACHINERY NEWS

(Continued from page 78)

During demonstration of the new setup it was shown forging crawler track links, using a set of dies loaned Erie by a major producer of farm machines. The track link is about 4 by 10-in. and weighs around seven pounds, finished.

On this application, three stations are employed—one station for



### STROM OPENS NEW PLANT IN TENNESSEE

*Strom Steel Ball Co. recently moved its plant and general offices from Cicero, Ill., to this modern plant and office building in Erwin, Tenn. Strom produces high-precision balls in a wide range of materials for the aircraft, automotive, and other manufacturing industries.*



## Prescription POWER... For Top Performance of Your Product

"Prescription Power" with a Lamb Electric Motor means—

- ... a motor designed to the exact requirements of your product ...
- ... built-in dependability that results from 42 years of small-motor experience ...
- ... favorable cost because our plant is geared to produce custom-made quality on a volume basis.

May we demonstrate these advantages of Lamb Electric Motors to you?

**THE LAMB ELECTRIC COMPANY • KENT, OHIO**

A Division of American Machine and Metals, Inc.

In Canada: Lamb Electric—Division of Sangamo Company Ltd.—Leaside, Ontario

# Lamb Electric

SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER **MOTORS**

Circle 223 on Inquiry Card for more data

pick-up of the hot 1-5/8 by 1-5/8 by 8 1/2-in. long blank; a second station to semi-forged the part; and a third station to finish the forging. (A fourth station for trimming can be added.)

The transfer mechanism has three sets of grip fingers mounted on two horizontal arms that extend through the left opening of the press. One of these arms is to the rear and the other in front of the dies. The sets of fingers on the arms, as well as the pick-up station and two die stations, are equally spaced (about 14-in. centers).

In operation, a hot bar is delivered from the furnace through the left opening of the press. A pusher positions the bar at the No. 1 pick-up station. The two arms move inward, gripping the bar, picking it up and placing it on the first die, or No. 2 station. Arms then move outward to clear the die, and return to the initial position.

The upper die comes down and semi-forges the bar. Kick-out pins lift the forging out of the die. Arms again move inward, gripping the forging with the second set of fingers and carrying it over to the second die, or No. 3 station. At the same time, a new blank can be placed in No. 2 station.

Fingers and arms move out as the upper die comes down and finishes the forging. Kick-out pins lift the forging; and the third set of fingers grip the forging, carrying it over and dropping it into a chute.

During operation the press runs continuously. Automatic feed is chain-driven from the eccentric shaft of the press for accurate

(Turn to page 124, please)

Albany 1, N. Y.  
Eastern Metals Warehouse, Inc.  
ALbany 89-3281

Birmingham 5, Ala.  
Allegheny Ludlum Steel Corp.  
FAirfax 2-0548

Buffalo 7, N. Y.  
Brace-Mueller-Huntley, Inc.  
VICTORIA 8700

Cambridge 38, Mass.  
Achorn Steel Company  
HAncock 6-9592

Charlotte 1, N. C.  
Edgcomb Steel Company  
FRanklin 5-3361

Chicago 32, Ill.  
Allegheny Ludlum Steel Corp.  
LAfayette 3-8650

Chicago 32, Ill.  
U. S. Steel Supply Div.  
BRunswick 8-2000

Cincinnati 1, Ohio  
Allied Abrasives & Tools, Inc.  
MULberry 1-2222

Cleveland 3, Ohio  
Allegheny Ludlum Steel Corp.  
UTah 1-0500

Dallas 22, Texas  
Peery Steel Company  
FEderal 1-4354

Dayton 4, Ohio  
Allegheny Ludlum Steel Corp.  
HEmlock 8386

Denver 16, Colorado  
Union Supply Co.  
AMhurst 6-2292

Detroit 20, Mich.  
Allegheny Ludlum Steel Corp.  
JOrdan 4-6900

Flint 1, Mich.  
Hall Steel Co.  
CEdar 4-6672

Grand Rapids 8, Mich.  
Good Steel Service, Inc.  
CHerry 1-4425

New York 17, N. Y.  
Allegheny Ludlum Steel Corp.  
MURrayhill 2-0369

Philadelphia 34, Pa.  
Edgcomb Steel Co.  
GARfield 3-6300

Rochester 1, N. Y.  
Brace-Mueller-Huntley, Inc.  
CONgress 6-6560

San Francisco 7, Calif.  
Allegheny Ludlum Steel Corp.  
GARfield 1-1804

Shelton, Conn.  
Trico Manufacturing Co.  
EDIsen 7-6214

St. Louis 8, Mo.  
Allegheny Ludlum Steel Corp.  
JEfferson 3-6700

Springfield 1, Mass.  
Allegheny Ludlum Steel Corp.  
REpublic 4-4996

Syracuse 1, N. Y.  
Brace-Mueller-Huntley, Inc.  
HOWard 3-3341

Worcester 8, Mass.  
Pratt and Inman  
PLEasant 6-9592

York, Pa.  
Edgcomb Steel Co.  
47-1411

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on tool  
steels**

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L. L. Ensworth & Son, Inc.  
CHapel 9-7791

Houston 1, Texas  
Peden Iron & Steel Co.  
CApital 2-2121

Indianapolis 1, Ind.  
Allegheny Ludlum Steel Corp.  
MEIrose 3-6521-2-3

Los Angeles 22, Calif.  
Allegheny Ludlum Steel Corp.  
RAYmond 3-1181

Milwaukee 12, Wisc.  
Allegheny Ludlum Steel Corp.  
WOodruff 4-3500

Minneapolis 10, Minn.  
Junger Steel & Supply Co.  
WAlnut 7-8080

www 7285

*Warehouses stocking Allegheny Ludlum's Tool and Die Steels are located conveniently throughout the country. There's one near you. Jot down its phone number and call the next time you have a problem or need steel.*

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Building, Pittsburgh 22, Pa. Address Dept. AI-10.

## ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages every grade of tool steel... every help in using it

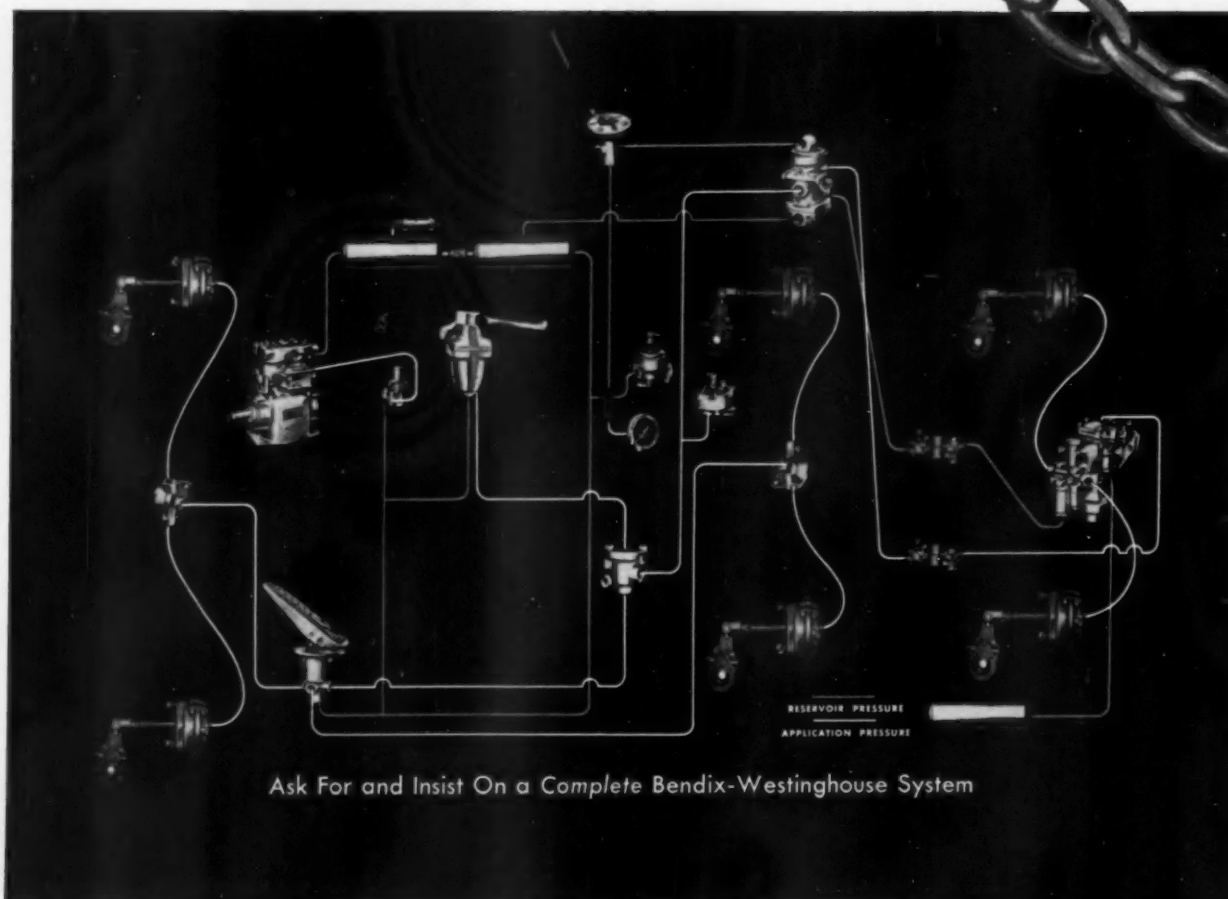


AUTOMOTIVE INDUSTRIES, October 15, 1958

Circle 224 on Inquiry Card for more data



## The chain's



Ask For and Insist On a Complete Bendix-Westinghouse System



**the thing!**

When you select air brakes your best and wisest buy is a *complete chain*—a complete brake system offering maximum durability, dependability, safety and economy.

Because it is system engineered and system built, a *complete* Bendix-Westinghouse Air Brake system offers you more—gives you more. Every component, every device is designed and built to perform a specific function with peak efficiency in a *closely related* system. And because it is a *complete chain*, it is more dependable, longer lasting, and will save you money.

Bendix-Westinghouse Air Brake systems are backed by the reputation and know-how earned in more than thirty years' experience as an air brake builder. Thousands of truck and bus operators know this. That is why more trucks and buses are equipped with *complete* Bendix-Westinghouse Air Brake systems than by all other makes combined. That is why—when you specify a *complete* Bendix-Westinghouse Air Brake system—you buy a chain for whose performance, dependability, and long life we accept full and complete responsibility.



A typical example of one of many intricate and dependable devices designed and built by Bendix-Westinghouse is the Brake Valve—a high quality, precise mechanism that accurately *controls* the flow of compressed air to other components in the brake system in direct response to the stopping requirements demanded by the driver.



**Bendix-Westinghouse**

AUTOMOTIVE AIR BRAKE COMPANY

General offices and factory—Elyria, Ohio. Branches—Berkeley, Calif. and Oklahoma City, Okla.





## YOU USE GRAY IRON CASTINGS

and are seeking **QUALITY...**

Shown is the core of a hydraulic valve casting. A typical example of an intricate casting where quality is paramount.

...and **SERVICE**

We realize your production depends on prompt, promised deliveries by your suppliers. Our business was founded and has grown because of the service we have constantly maintained.

and assistance in solving really technical problems

We have been making castings for over sixty years, but do not depend entirely on this valuable experience of time. We employ 3 graduate metallurgists in a modern laboratory who keep constant watch over our metals and foundry sand. And, of course, their vast knowledge is always available to help you solve your design or casting problems.

you're on the right track when you call on



THE GRAY IRON DIVISION OF  
**GENERAL MALLEABLE CORPORATION**

710 EAST MAIN STREET • WAUKESHA • WISCONSIN



49 lb. manifold



Core for  
50 lb. valve



160 lb.  
radiator tank





## Pressure pad of FAIRPRENE® smooths an aileron's skin at 350° F.

Shown above, an aileron section is placed in the fixture where heat and pressure cure an adhesive that bonds the skin to a honeycomb core. Section is a trailing edge for Northrop Aircraft's T-38, 2-seater supersonic jet trainer. Perforated material is "Fairprene"® silicone rubber sheet stock. After placing the part, another layer of "Fairprene" is put on top, pressure is applied, and the part is heated to about 350° F.

Northrop found only "Fairprene" is economical for service at such temperatures. Because of its resilient properties,

"Fairprene" prevents an indentation or scratch from a speck of dirt—helps assure the absolutely smooth fuselage skin that's a must for jet-age speeds.

This is an example of the superior performance of "Fairprene" that could prove useful for your product or process. If you need a material resistant to gas, oils, solvents or corrosive chemicals, abrasion or flex cracking—materials that retain their properties at 100°F. or 500°F. . . or possess superior insulation or anti-stick properties, there's a Du Pont coated fabric or sheet stock to do the job.

And to help you use these materials most effectively, you can call on free technical help from Du Pont. For more specific information on the variety of "Fairprene" materials available, mail the coupon.



REG. U. S. PAT. OFF.  
BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY

### DU PONT INDUSTRIAL COATED FABRICS

#### COATING MEDIUMS

Neoprene • Buna-N • Silicone • Polyacrylate  
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#### SUBSTRATES

##### Fabrics

Cotton • Nylon • "Dacron"† • Asbestos  
Glass • Rayon • TFE-fluorocarbon  
Also elastomer sheet stocks without fabric inserts and cements

† "Dacron" is Du Pont's registered trademark for its polyester fiber

\* "Fairprene" is Du Pont's registered trademark for its coated fabrics, sheet stocks and cements.

E. I. du Pont de Nemours & Co. (Inc.), Dept. AI-810  
Fabrics Division, Wilmington 98, Delaware

Please send me further information about coated fabrics.

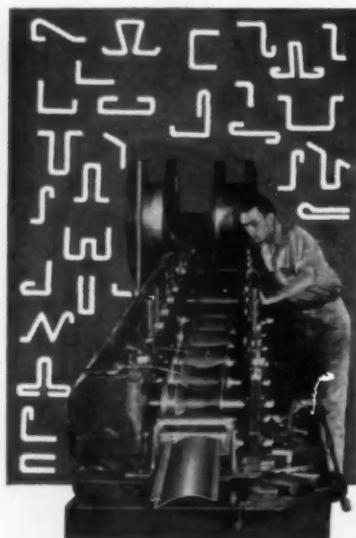
I am interested in using a coated fabric for \_\_\_\_\_

Name \_\_\_\_\_ Title \_\_\_\_\_

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City \_\_\_\_\_ State \_\_\_\_\_



## With a YODER... ONE MAN PRODUCES 30,000 FEET OF SHAPES A DAY!

Cold-roll forming with a Yoder Roll-Forming machine makes spectacular production possible in many metalworking applications and industries.

A multitude of shapes, simple or complex, produced from a wide variety of coated or uncoated stock, and destined for a virtually endless list of purposes, can be easily, quickly and economically produced with a Yoder cold-roll forming machine.

Whether it be moldings, structurals, siding, roofing, tubulars, cabinet shells, or any one of a thousand requirements, it can be quickly produced with accuracy and uniformity the Yoder way. The conversion cost is usually so low that even part-time operation makes a Yoder cold-roll forming line a profitable investment.

A great many modifications of the basic shape such as welding, coiling, ring forming, notching, perforating, embossing and cutting to length, can be simultaneously introduced with little or no additional labor cost. It will pay you big dividends to fully investigate the advantages of Yoder cold-roll forming. A fully-illustrated, 88-page book clearly discusses every important aspect of this amazingly versatile method of metal fabrication... it is yours for the asking.

**THE YODER COMPANY**  
5553 Walworth Ave. • Cleveland 2, Ohio  
Visit Booth 2770, Metal Show, October 27-31



Circle 228 on Inquiry Card for more data

## MACHINERY NEWS

(Continued from page 118)

timing. Gripping and transferring motions are mechanically generated. Kick-out pins are operated from a cam on the eccentric shaft. Both air and oil are piped to the die area for, respectively, clearing away slag and lubricating the dies.

The press runs at 40 spm, and since a finished forging can be made on every stroke of the press, output could be at the rate of 2400 per hour. However, to conserve die life a hot bar is fed on every second stroke for a production rate of 20 forgings per minute, or 1200 per hour. Comparable output for a hand-operated press, with three men versus one man, was given as 375 forgings per hour.

Conveying equipment to and from the press was not demonstrated, but officials of the firm anticipate the company will be in a position to supply the complete "package" where desired for specific applications.

## NMTBA Lists Films

Motion picture films on machine tools and machining operations are listed in a new 26-page booklet published by NMTBA.

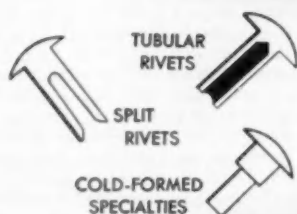
The 147 films, with a few exceptions, are 16 mm with sound. Many are in color. Each film is available without charge upon request directed to the particular company which produced it.

Copy of the booklet may be obtained from the National Machine Tool Builders' Association, 2071 East 102nd St., Cleveland 6, Ohio.

Production of even the most complex weapons and equipment can be handled by private industrial plants, the Air Force emphasizes. Where there is enough existing output capacity the Air Force will not put up money for plant expansion. The purpose of holding back military funds for new or bigger factories is to prevent creation of a special Government-owned plant system for defense production.

## COST-CUTTING PRODUCTION TEAM

### MILFORD RIVETS and RIVETERS



Full or  
Semi-automatic  
Bench or  
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Single or  
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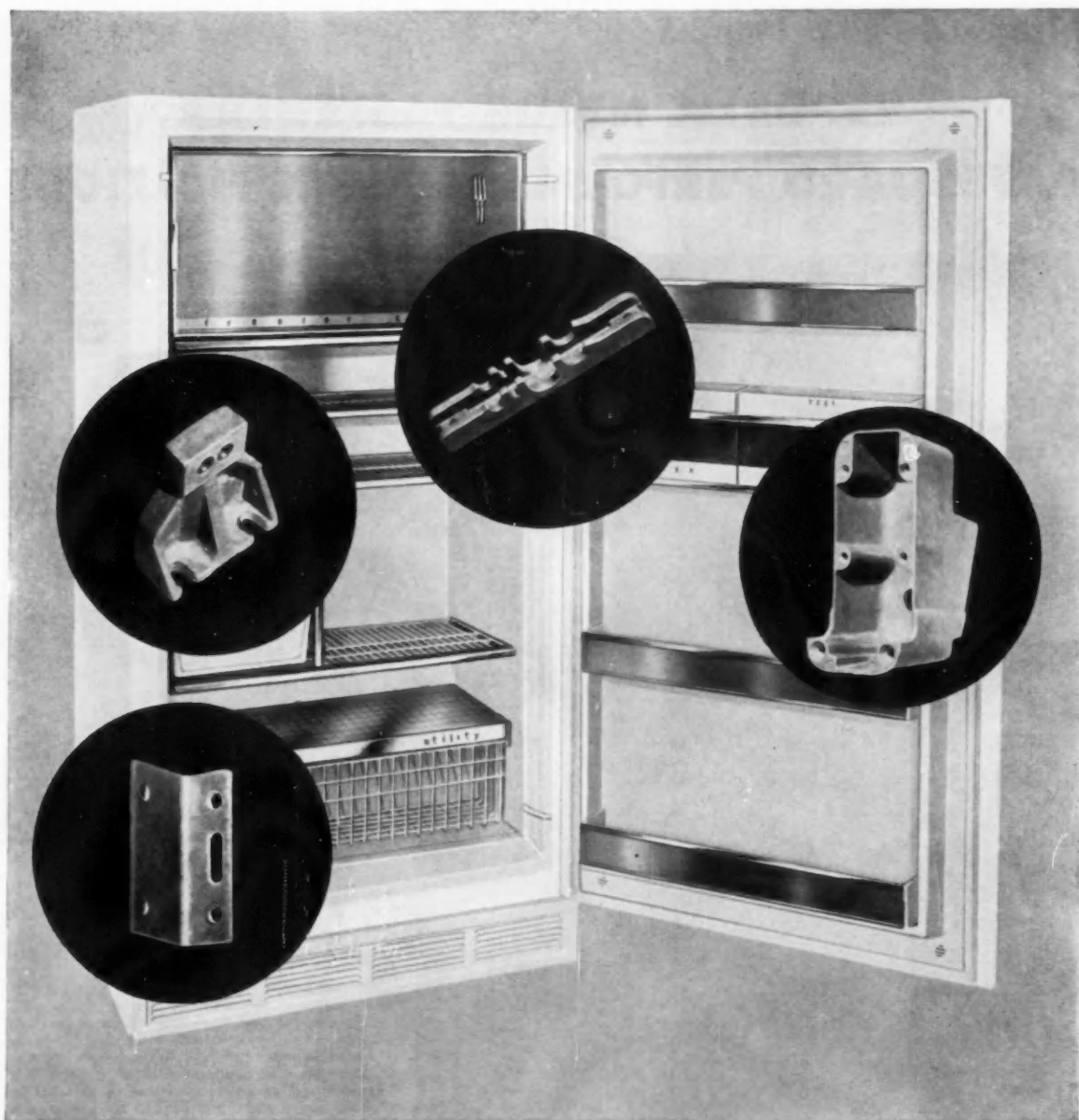


**FIVE MANUFACTURING PLANTS  
GIVE UNMATCHED SERVICE**

**THE MILFORD RIVET & MACHINE CO.**

MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA  
ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

Circle 229 on Inquiry Card for more data



## Kelvinator gets big benefits from premix moldings

Premix moldings are making an important contribution to performance of Kelvinator refrigerators.

Strike mounting plates, tie-straps, tubing retainers and lock housings for the Kelvinator are all premix moldings. They've proved tough and resilient . . . excellent shock absorbers. And their thermal insulating properties contribute to the economical operation of the refrigerator.

When resins and reinforcing fibers are blended beforehand,

moldings are stronger, wall thicknesses more uniform, weak spots are eliminated. Small and large, simple and complex, premix moldings are not only improving products but cutting costs for hundreds of manufacturers.

If your product calls for strong, rigid, reinforced plastics, look into premix moldings made with Dow vinyltoluene or Dow styrene. Get the names of molders and suppliers from your nearest Dow sales office or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Dept. 2207H-1.

YOU CAN DEPEND ON

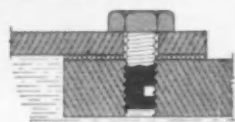
**DOW**



*In Gemco Power Mowers,*

## **REPUBLIC NYLOK FASTENERS**

### **SAFEGUARD PERFORMANCE SPECIFICATIONS**



**REPUBLIC NYLOK FASTENERS** are used extensively on Gemco Rotary, Reel, and Riding Power Lawn Mowers. Photograph above shows blade assembly securely locked to engine shaft with Nylok Cap Screw. An added advantage of Republic Nylok Bolts and Cap Screws for some applications is their ability to seal against fluid escape when wrenched tight. As shown in sketch above, Nylon pellet in bolt body blocks flow of fluid along helical thread path.

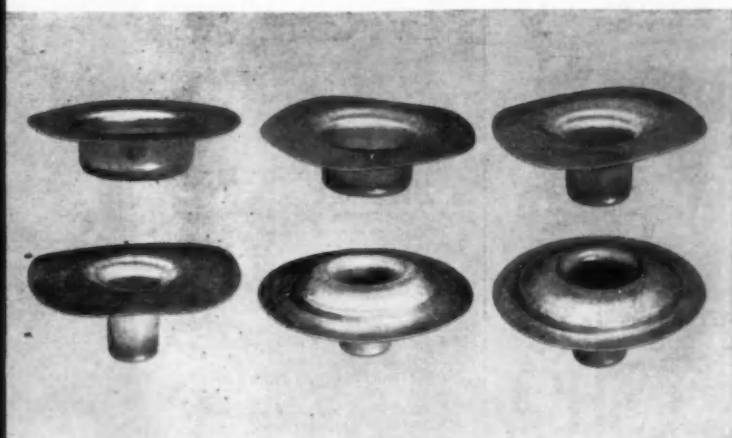
Modern Gemco Power Mowers, manufactured for General Mower Corporation, Buffalo, New York, are designed to deliver reliable, heavy-duty service with minimum of maintenance. Gemco engineers safeguard these performance specifications by using only quality materials, including Republic Nylok® Bolts and Nuts for critical assembly connections.

For example, in the Gemco Rotary Mower line, a particularly vital point is the assembly of blade to engine drive shaft. Use of a Republic Nylok Hex Head Cap Screw for this purpose assures a vibration- and shock-proof connection of maximum safety and strength. Moreover, the Nylok cap screw can be repeatedly removed and re-used to permit blade sharp-

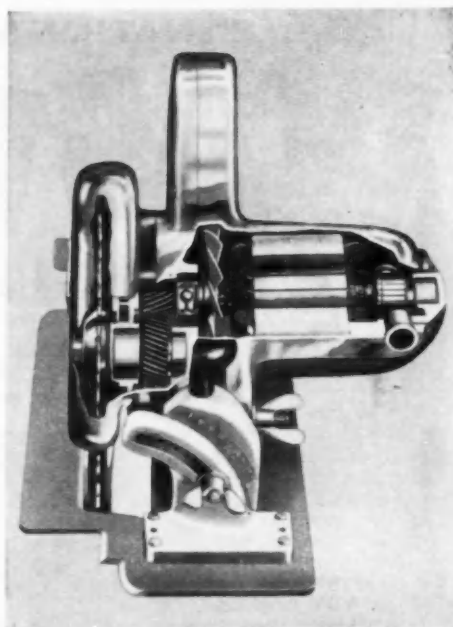
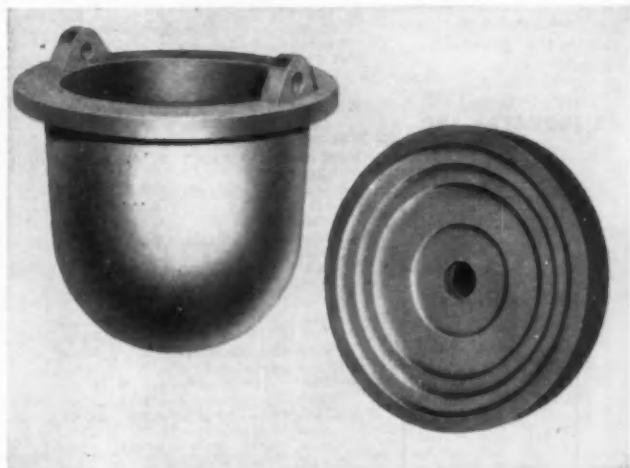
ening, reversal, or replacement—without loss of holding power.

The unique characteristics of Republic Nylok Bolts and Nuts suit them perfectly to many tough fastening problems. Permanent locking is provided by a nylon pellet imbedded in the fastener body which forces a tight, metal-to-metal lock between opposite mating threads. A positive grip is maintained wherever wrenching stops. Resiliency of pellet allows both adjustment and re-use.

It will pay you to explore these and other advantages of Republic Nylok Fasteners in relation to your assembly requirements. For details, contact your nearest Republic Office, or mail coupon.



HERE ARE SIX STEPS of possibly the severest manufacturing torture that a galvanized steel sheet can take. In its final form, it becomes the end piece of a muffler manufactured by the Mackenzie Muffler Company, Inc., Youngstown, Ohio. It is made out of Republic Continuous Galvanized Sheets. Despite the many deep drawing operations, the coating does not crack, flake, or peel. Republic Galvanized Sheets can do a profitable job for you. Clip the coupon and mail it in for more information.



REPUBLIC COLD FINISHED ALLOY STEELS provide required reliability in gear components of this portable electric saw produced by the Black & Decker Manufacturing Company, Towson, Maryland. The strength and toughness of these steels enables Black & Decker gears to shrug off repeated shock and heavy loading—and come back for more. Republic Cold Finished Alloy Steels may provide the perfect answer to a tough application or production problem troubling you. Send coupon for further data.

MELTING POT AND FLYWHEEL SPECIFICATIONS for these castings produced by The Union Metal Manufacturing Company, Canton, Ohio, call for a pig iron with great machinability, density, and heat resistance characteristics. Over the years, the ideal answer to these requirements has been Republic Chateaugay Pig Iron. Exclusive with Republic, Chateaugay combines high carbon with unusually low phosphorus and is copper-free. Chateaugay's uniform distribution of chemical elements produces a dense grain structure which results in economical machining, plus excellent heat- and wear-resistance. For more information, mail coupon.

# REPUBLIC STEEL



*World's Widest Range  
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Please send more information on:

- ☐ Nylok Nuts
- ☐ Chateaugay Pig Iron
- ☐ Cold Finished Alloy Steels
- ☐ Continuous Galvanized Sheets

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Company \_\_\_\_\_

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Don't miss the 8th NATIONAL

# PLASTICS

## EXPOSITION

INTERNATIONAL AMPHITHEATRE  
CHICAGO, ILL.

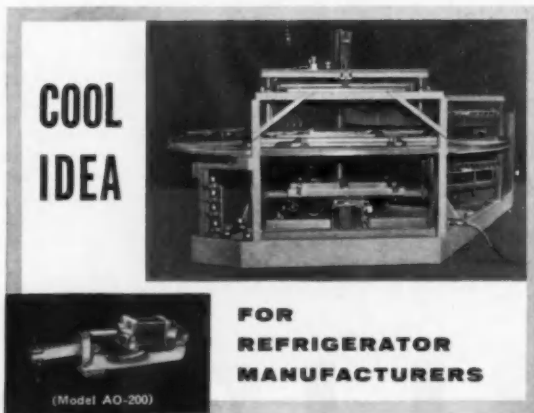
### NOV. 17-21



What's new in plastics? Visit the show and keep abreast of this ever-changing industry. See all that's latest and best . . . new plastics you can use in your products. New equipment to speed production . . . find out how to make bigger profits through use of plastics. Write for free tickets now . . . use your company letterhead, please—the general public won't be admitted.

**FIND OUT HOW YOU CAN USE "PLASTICS FOR PROFITS"**

SPONSORED BY: THE SOCIETY OF THE PLASTICS INDUSTRY, INC.  
250 Park Avenue, New York 17, N. Y.  
Circle 232 on Inquiry Card for more data



Knu-Vise air-operated clamps are featured on a new 3-station automatic machine developed by the Brown Machine Company, Beaverton, Michigan, for vacuum forming inner door panels and other refrigerator parts at a maximum production rate.

The machine is completely automated with air clamps, mold table, vacuum system and fans, and rotating mechanism all operating from a single switch. 100 panels per hour—as big as 42" x 72"—can be produced.

Quality standards are so high that only dependable Knu-Vise air-operated clamps can be used. Take a tip—investigate Lapeer today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

**KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.**

3041 DAVISON ROAD  
LAPEER, MICHIGAN

WESTERN DIV.: PECK AND LEWIS CORPORATION  
4430 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7146  
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.  
1131 Pettit Road, Burlington, Ontario

Circle 233 on Inquiry Card for more data

## Gov't Contract Awards

(Continued from page 108)

GILL ELECTRIC MFG. CORP., Redlands, Calif.  
Battery aircraft storage—9864 ea—\$344,549

B. F. GOODRICH CO., B. F. GOODRICH AVIATION PRO., Akron, Ohio  
Wheel assys, aircraft—596 ea—\$37,021

GOODYEAR AIRCRAFT CORP., Akron, Ohio  
Prop shafts—8 ea—\$23,434

GOODYEAR TIRE AND RUBBER CO., Akron, Ohio  
Spare parts, F-89 aircraft—\$36,646

GRAMM TRAILER CORP., Lima, Ohio  
Semi-Trailer—\$93,396

HARRINGTON-WILSON-DAUM CORP., Mt. Vernon, N. Y.  
Lathe, toolmaker—2 ea—\$29,598

HARRINGTON-WILSON-DAUM CORP., Mt. Vernon, N. Y.  
Precision, drilling machine—\$40,032

HEIL CO., Milwaukee, Wis.  
Aircraft refueler, kit installed—\$5,847,604

HOLLEY CARBURETOR CO., Warren, Mich.  
Aircraft engines, repair kits—640 to 3700 ea—\$551,156

HOLLEY CARBURETOR CO., Warren, Mich.  
Aircraft engines, spare parts—15 to 93,000 ea—\$684,949

HOWARD-COOPER CORP., Portland, Oreg.  
Tractors—2 ea—\$37,077

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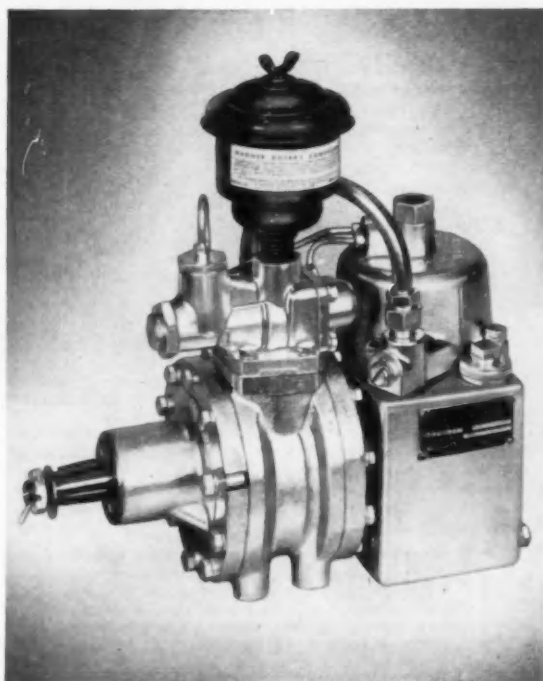
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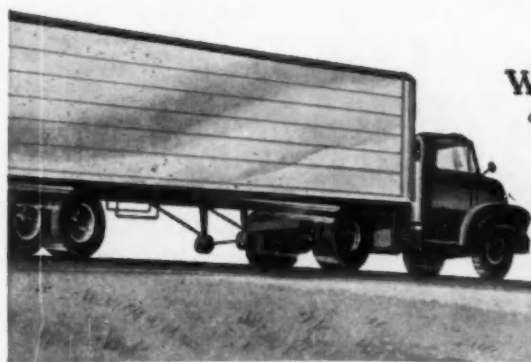
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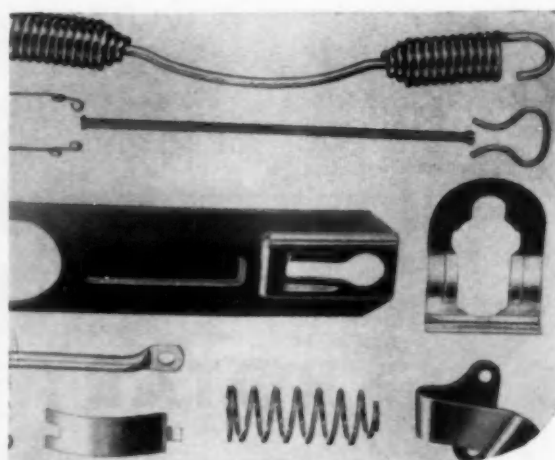
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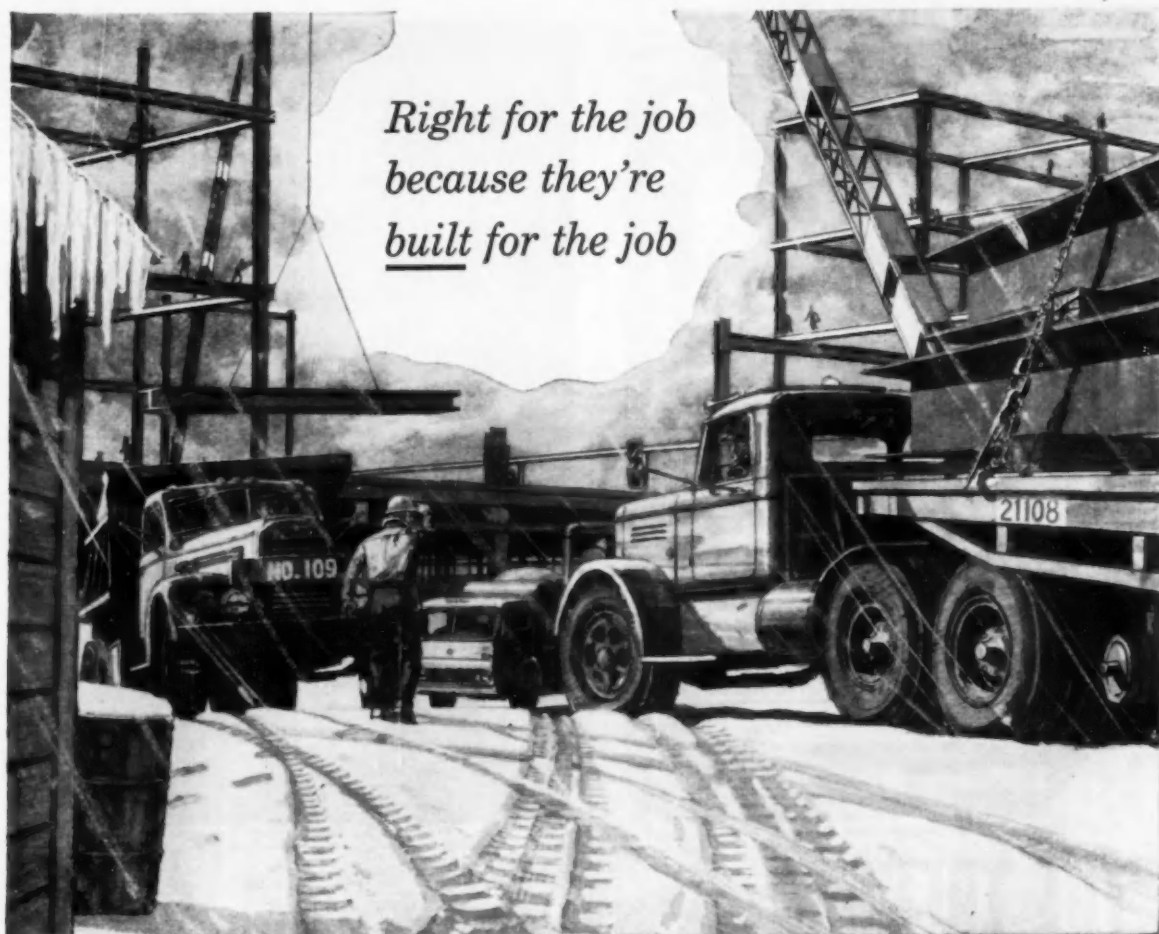
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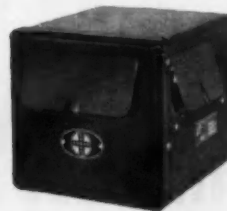
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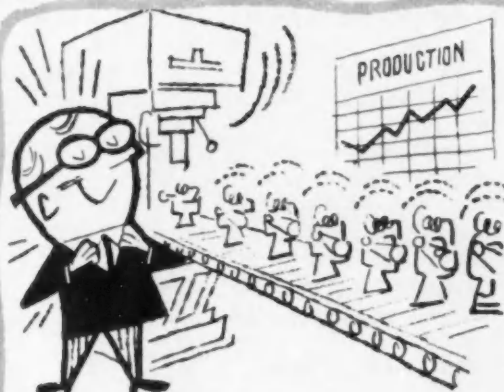
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Ribs, tail lamps and ornamental wheel cover designed as integral parts of rear deck lid.

Aluminum hood with integral grille, ribs and cowl air intake louvers designed in a single aluminum stamping.

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## How and why Aluminum and the Integral Design Concept offer important advantages in hood panels and deck lids

As an example of integral design possibilities, illustrated on the front side of this page is an aluminum hood with integral grille and ribs in a *single* aluminum stamping. Following stamping, the bright areas can be brightened chemically or mechanically and the entire panel anodized. The bright areas can then be masked and the panel painted to match adjacent body colors. Paint films adhere remarkably well to anodized aluminum. The excellent forming characteristics of aluminum sheet permit complex stampings which result in increased strength as the metal is cold worked.

Similar techniques and the same general design approach can be employed in the rear deck lid. Stamped ribs can be incorporated in the lid to provide additional stiffening. Script, V-emblems, crests or other ornamentation including tail lamp components and ornamental wheel cover can be included in the stamping die.

This integral concept provides important *cost-reducing* possibilities through the reduction in the number of components normally associated with such construction. Light weight of the panel with simplification of hinging and counter balancing mechanisms is

another advantage. And integration also provides cost reduction possibilities by reducing amount of tooling required.

*Weight saving* is another advantage of aluminum in these body element applications. Weight saved by aluminum panels can run up to 50 to 65%. Aluminum body panels also can reduce overall body weight and lower the center of gravity, thus providing improved performance and stability.

On this type of application and on countless others, Reynolds Aluminum Specialists will be glad to work with you to help you get the very most from the aluminum you use. For details on this service and on aluminum mill products and fabricated aluminum parts and trim, call your nearest Reynolds Office. Or write *Reynolds Metals Company, Fisher Building, Detroit 2, Michigan or P.O. Box 2346-MV, Richmond 18, Virginia.*

**NOTE:** Before you buy any part—have it designed and priced in aluminum. Basic material costs do not determine part costs. New techniques and processes—applicable only to aluminum—can give you a better product at a lower final cost.

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the metal for automation

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## FREE LITERATURE

### Roller Bearings 1

Catalog 258 illustrates five standard series of self-aligning spherical roller bearings, with bore sizes ranging from 40 mm up through 1060 mm. *Bantam Bearings Div., The Torrington Co.*

### Hydraulic Presses 2

Bulletin DH-126, 8 pages, describes an extensive line of manual and air-operated hydraulic presses, from a 3-ton mechanical arbor press to 25, 40, 60, 80, 125, and 150-ton units. *ACCO Equipment Div., American Chain & Cable Co.*

### Weather Protected Motor 3

Bulletin 2550, 6 pages, describes how a line of horizontal weather protected motors can be used in extremely high winds, driving rain, snow, sleet and sandstorms, while utilizing surrounding air for cooling purposes. *The Louis Allis Co.*

### Alloy Welded Tubing 4

A bulletin on special purpose alloys for tubing and pipe used especially in the aircraft, missile, rocket, nuclear energy and chemical fields is available from the *Alloy Tube Div., The Carpenter Steel Co.*

### Magnetic Line 5

A bulletin describes a full range of magnetic equipment for protection against tramp iron such as magnetic pulleys; suspended magnets; parts separators and others. *Stearns Magnetic Products Div., The Indiana Steel Products Co.*

### Testers and Equipment 6

CSI catalog 59 illustrates 60 different testers or equipment used in such fields as adhesives, cement, metals, insulation and textiles. *Custom Scientific Instruments, Inc.*

### Test Equipment 7

Bulletin 6, 4 pages, describes a line of environmental test equipment for mass-testing of production components. *Mantec Inc.*

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## Thermocouple Wells 8

Serv-Rite drilled thermocouple wells, thermometer sockets, and thermometer test wells are described in Bulletin 2000. *Claud S. Gordon Co.*

## Finishing Compound 9

Compounds for deburring, burnishing and descaling metals in barrel operations are the subject of an eight-page bulletin prepared by *Oakite Products, Inc.*

## Automatic Feeder 10

Form No. 3R3384 covers a full line of automatic parts feeders. These in-

clude non-mar feeder-orientors for handling fragile and highly finished parts. *Radio Corp. of America, Industrial Electronic Products.*

## Servo Amplifiers 11

A series of charts aids the engineer in selecting the applicable transistor/magnetic servo amplifiers for various error signal inputs and servomotor loads. *Magnetic Amplifiers, Inc.*

## Barrel Finishing Unit 12

Bulletin 255 describes the Vibraslide barrel finishing machine which

features a vibrational force incorporated into the barrel that allows the work to be done with no damage to the parts. *Metal Finish, Inc.*

## Calibrating System 13

Bulletin 169, 4 pages, gives specifications of a transistorized, battery-powered calibrating and weighing system which is designed for the calibration of load cells, torque-measuring dynamometers, and other force measurement equipment. *Morehouse Machine Co.*

## Drilling Machine 14

Model IF drilling machine, specifically designed to save space, labor and material is described in Bulletin 160-R. *Edlund Machinery Co.*

## Hydraulic Pumps, Motors 15

Bulletin 5301 gives information on a series of hydraulic pumps and motors which are designed to operate intermittently at pressures up to 1000 psi with momentary overloads up to a maximum of 1500 psi. Included are dimensions for 18 different sizes of units and typical performance curves. *Vickers Inc., Div. of Sperry Rand Corp.*

## Converters 16

A complete line of liquid oxygen and nitrogen converters is described in folder F-1250, 6 pages. These converters are used for fuel pressurization for missiles and pressurization and inertion systems for many types of aircraft. *Linde Co., Div. of Union Carbide Corp.*

## Synchronous Motors 17

Booklet B-7292, 27 pages, presents a summary of types and features of a line of motors and controls. The booklet contains motor selector charts, application data and formulas for calculating power factor. *Westinghouse Electric Corp.*

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### Capillary Tubing

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Data Memorandum II, 11 pages, describes capillary tubing furnished in lengths up to 3000 feet and tested for flow rate when required. A length chart gives the maximum lengths for various combinations of tubing outer and inner diameters. *Superior Tube Co.*

### Distribution Centers

25

Bulletin GEC-1355A, 28 pages, provides information on integral distribution centers rated 112½ Kva and above, liquid filled, and 300 Kva and above open- and sealed-dry. *General Electric Co.*

### Iron Powder Book

26

Form ADV 1014, 52 pages, is a book describing Republic types cdf and MS iron powders. The book also lists the complete specifications for each iron powder and shows the test shapes and calculations methods. *Republic Steel Corp.*

### Thermocouples

27

Bulletin P1281 describes types, materials, sizes, and thermocouple curves as well as the applications for which Armox Thermocouples are designed. *The Bristol Co.*

### Steel Cabinets

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Bulletin B-50, 4 pages, describes eight cabinet styles for use in industrial plants. *Penco Div. of Alan Wood Steel Co.*

### Flowrator Meter

29

Bulletin 10A1145 describes a variable-area indicating type flowrator meter with armored glass tube design suitable for pressures up to 3000 psi. *Fischer & Porter Co.*

### Open-Type Motors

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Bulletin 05-51B9040 describes "Super-Seal" open-type motors which are unaffected by moisture, dust, dirt, oils, acids, and alkalis. *Allis-Chalmers Manufacturing Co.*

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